MONTHLY WEATHER REVIEW.

Editor: Prof. Cleveland Abbe.

Vol. XXIX. MARCH, 1901. No. 3

INTRODUCTION.

The Monthly Weather Review for March, 1901, is based on reports from about 3,100 stations furnished by employees and voluntary observers, classified as follows: regular stations of the Weather Bureau, 159; West Indian service stations, 13; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,562; Army post hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Railway Company, 96; Canadian Meteorological Service, 32; Mexican Telegraph Service, 20; Mexican voluntary stations, 7; Mexican Telegraph Company, 3; Costa Rica Service, 7. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Mr. Maxwell Hall, Government Meteorologist, Kingston, Jamaica; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Commander Chapman C. Todd, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San Jose, Costa Rica; Captain François S. Chaves, Director of the Meteorological Observatory, Ponta Delgada, St. Michaels, Azores, and W. M. Shaw, Esq., Secretary, Meteorological Office, London.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the Review, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′ or 10^h 30^m west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now always reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. Garriott, in charge of Forecast Division.

March completed a three-months period of exceptionally severe storms over the North Atlantic Ocean. Forecasts of the direction and force of the wind along the transatlantic steamer routes west of the Banks of Newfoundland were made daily during the month and published on the weather maps issued at Boston, New York, Philadelphia, Baltimore, and Washington. On March 28 advices were issued that steamers westward bound from European ports would encounter hard gales in mid ocean. Reports from shipmasters show that the daily forecasts and storm advices were verified.

Severe gales were reported at sea off the north Pacific coast of the United States during the first and third decades of March. The gales which reached the United States were forecast. Along the middle and south coast of California moderate winds prevailed.

Several severe storms crossed the Great Lakes, warnings of which were issued to open ports on Lake Michigan. Heavy snow and high winds prevailed in the States of the upper Mississippi and Missouri valleys and the Lake region on the 19th and 20th. From the 23d to the 25th traffic in Nebraska, Colorado, Wyoming, and western Kansas was blocked by snow, and a loss of cattle on the ranges was reported. Heavy snow fell in the middle-western States on the 29th. The snowstorms referred to were covered by the daily forecasts and special warnings were issued by the Chicago office of the Weather Bureau of the heavy snow in Nebraska, Colorado, and western Kansas on the 23d, 24th, and 25th.

From the 4th to the 6th a cold wave overspread the country generally east of the Rocky Mountains. Beginning on the 4th, cold wave warnings were displayed in the Ohio Valley, the middle-western and the interior of the southwestern States, and on the morning of the 5th cold wave and frost warnings were issued for the Gulf and South Atlantic States. Warnings of high northerly winds and low temperature in northeastern Mexico were issued on the 5th by the Weather Bureau office at Galveston, Tex. The frosts of the interior of the North Pacific States during the latter part of the month were forecast by the Weather Bureau office at Portland, Oreg.

Attending the movement of a storm from western Texas over the upper Lake region from the 9th to the 11th the western and southwestern States were swept by heavy gales during the 9th and 10th. During the afternoon and night of the 9th severe local storms occurred from northeastern Texas over Arkansas and parts of Tennessee and Kentucky,

and thunderstorms were reported generally in the middle and east Gulf States.

The rivers of the Sacramento Valley, California, continued at a high stage during the month. From the 1st to the 3d a slight freshet occurred in the lower Willamette River. From the 25th to the 27th floods were reported in the streams of Wisconsin, Michigan, and northern Illinois. At the close of the month the Genessee, Mohawk, and Chenango rivers, New York, were swollen by rain and melting snow.

CHICAGO FORECAST DISTRICT.

On the morning of the 4th cold wave warnings were ordered over the southern and eastern parts of the district in advance of a cold wave which developed over the British Northwest on the 3d. The cold wave was very severe for the season, and the information which was given to the public in advance must have been of great value. A number of severe storms passed northeastward from the Rocky Mountain slope over the Lake region. Warnings of the approach of these storms were issued well in advance to open ports on Lake Michigan, and were followed carefully by vesselmen, as no casualties occurred during the month.—*H. J. Cox, Professor.*

SAN FRANCISCO FORECAST DISTRICT.

The month as a whole was rather free from marked disturbances, except in the extreme southern portion of the district. It was particularly fortunate that such weather conditions prevailed, inasmuch as the rivers of the Sacramento Valley, owing to previous warm weather, heavy rainfall, and the rapid melting of snow, were at an exceedingly high stage.—*A. G. McAdie, Forecast Official.*

PORTLAND, OREG., FORECAST DISTRICT.

The storm warnings of the month were verified by gales on or near the north Pacific coast. The frosts and freezing temperatures in the eastern part of the district during the latter part of the month were, as a rule, successfully forecast. A slight freshet in the lower Willamette River from the 1st to 3d was accurately forecast.—*Edward A. Beals, Forecast Official.*

RIVERS AND FLOODS.

During the month much more rain fell over the Mississippi watershed than during February, 1901, and, as a consequence, the Mississippi River and its tributaries were decidedly higher, particularly during the latter half of the month. The breaking up of the ice in the upper Missouri and upper Mississippi rivers and the melting snows also largely assisted in augmenting the stages of the rivers. The rivers of Wisconsin and Michigan were in flood during the last week of the month owing to the general rains and the thaw from the 22d to the 24th, inclusive. Ice gorges formed in many places; the smaller streams overflowed their banks, causing much damage to low-lying property; dams were washed away; a large number of bridges was either materially weakened or else carried entirely away, and railroad tracks washed away in some places.

The rise in the Ohio was of immense benefit to the navigation interests, and it is said that about 10,000,000 bushels of coal left Pittsburg for southern points.

The Illinois River, at Peoria, Ill., was above the danger line from the 14th to the 31st, inclusive, but was not so high below.

The rivers of the Gulf and Atlantic systems were also much higher than during February. Those of North Carolina were near or above the danger lines from the 27th to the 29th, inclusive, while those of South Carolina were considerably above. The usual flood warnings were issued twenty-four hours in advance. A warning of a 30-foot stage in the Savannah River, at Augusta, Ga., was issued on the 26th, and a stage of 29.6 feet was recorded on the morning of the 28th.

The following report on the moderate floods in the rivers of eastern Alabama and northwestern Georgia was prepared by Mr. F. P. Chaffee, Official in Charge of the United States Weather Bureau office at Montgomery, Ala.:

Heavy to very excessive rains set in over the upper portions of the watershed on the morning of March 25. Rome, Ga., reporting at noon that 4.41 inches had fallen since 8 a. m. Special 2 p. m. reports were immediately called for from all substations; which showed that up to that hour 1.36 inch had fallen at Canton, Ga.; 2.05 at Resaca, Ga.; 5.61 at Rome, Ga.; and 3.51 at Gadsden, Ala. Rome, Ga., was wired that a 26-foot stage was expected at that place by the morning of the 26th, warning issued for moderate flood stages at Gadsden and Lock No. 4, Ala., and for rapid rises at Wetumpka, Montgomery, and Selma, Ala., and advising that stock be moved from low grounds, and other necessary precautions taken. During the twenty-four hours ending at 8 a. m. of the 26th, 2.42 inches of rain had fallen at Canton, Ga.; 2 79 at Resaca, Ga.; 6.22 at Rome, Ga.; 4.41 at Lock No. 4, Ala.; and considerably less at points lower down, causing such pronounced 24-hour rises as 15.7 feet at Resaca, Ga., 18.4 at Rome, Ga ; 13.5 at Gadsden, Ala.; and 11.7 at Lock No. 4, Ala. Taking into consideration the fact that upon a previous occasion such excessive rains had given even more rapid rises in these rivers, additional warnings were issued for moderate flood stages at all points, except Wetumpka, Ala. The flood crest passed Rome, Ga., during the evening of the 27th, though, on the morning of the 28th, the rivers were still rising south of Wetumpka, Ala., and continued to rise slowly during the 29th; at 8 a. m. of this date, 33.0 feet was reported from Wetumpka, Ala.; 31 feet from Montgomery, Ala., and 31 feet from Selma, Ala. On April 1 moderately heavy rains occurred over the middle and upper watersheds; these rains started a secondary rise, which only slightly augmented the previous one, and a final forecast was then made for stages of 39 feet at Montgomery and 40 feet at Selma, Ala. The flood crest passed Montgomery on the 3d and Selma during the afternoon of the 4th.

The following maximum stages were reached on these rises:

Stations.	Maximum stage.	Danger line.
	Feet.	*Feet.*
Ressca, Ga	25.8	25
R me, Ga	27.0	30
Gadsden, Ala	32.0	18
Lock No. 4, A'a	18 0	17
Wetumpka, Ala	38.4	45
Montgomery, Ala	37.4	3[illegible]
Selma, Ala	38.5	35

The warnings were widely disseminated by telegraph, telephone, and mail, and through the local press; this office has heard of no damage which a warning could have averted. Large areas of prepared land were inundated, and farming operations entirely suspended in the low grounds drained by these rivers.

Danger-line stages were not reached in the rivers of western Alabama.

Nothing of interest occurred along the rivers of the Pacific coast States, although the lower Sacramento River was above the river danger line of 25 feet at Sacramento, Cal., during the first seven days of the month.

Ice had moved out of all the rivers by the end of the month. At Albany, N. Y., on the Hudson River, the ice moved out quietly on the 22d and 23d without causing any damage. On account of the comparatively low temperature a rapid thaw was prevented, and the water was not sufficiently high to create any serious apprehension. On the 27th it was higher than at any time since the spring of 1900, but was only a little over the docks at that. On the 28th the upper Mohawk River was free from ice. The first boat of season arrived from Newburg, N. Y., on the 28th, and the first one from New York, N. Y., on the 29th.

In the Susquehanna River, at Harrisburg, Pa., the ice went out on the 11th, and at Wilkesbarre, Pa., during the night of the 12th.

In the Missouri River the last ice at Kansas City, Mo., was seen on the 1st, and the last at Omaha, Nebr., on the 16th. It went out at Sioux City, Iowa, on the 11th, at Yankton, S.

D., on the 10th, at Pierre, S. D., on the 14th and 15th, and at Bismarck, N. D., on the 31st, navigation being resumed almost immediately after the channels became clear.

In the Mississippi River the ice gorge at the Wabash Bridge, at Hannibal, Mo., broke on the 2d, and the river was free from ice on the 7th; at Muscatine, Iowa, the ice went out on the 15th; at Davenport, Iowa, from the 16th to the 20th; at Leclaire, Iowa, on the 17th; at Prairie du Chien, Wis., from the 24th to the 26th; at Dubuque, Iowa, south of the bridge on the 17th, and north of the bridge on the 23d; at La Crosse, Wis., in front of the city on the 29th, but not below the railroad bridge until the 31st, and at St. Paul, Minn., below Robert street bridge on the 24th, but not above until the 27th.

Dates of resumption of navigation were as follows: Grafton, Ill., 9th; Hannibal, Mo., 16th; Keokuk, Iowa, 24th; Davenport, Iowa, 25th, and St. Paul, Minn., 27th. Navigation on the Ohio River, above Cincinnati, Ohio, was resumed on the 5th after a suspension since February 12, caused by low water resulting from ice gorges in the river above.

A new special river station of the Weather Bureau was established on March 1, 1901, at New Madrid, Mo., on the Mississippi River, a part of the Memphis, Tenn., district. The new station is 70 miles below Cairo, Ill., 160 miles above Memphis, Tenn., and 1,003 miles from the mouth of the river.

The highest and lowest water, mean stage, and monthly range at 135 river stations are given in table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are: Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocities.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	Miles.	Days.	Miles.	Miles.
I	1, p.m.	50	97	4, a.m.	48	54	2,075	2.5	830	34.6
II	6, a.m.	29	99	9, a.m.	32	64	2,050	3.0	683	28.5
III	11, a.m.	30	88	13, a.m.	32	64	1,500	2.0	750	31.2
IV	14, a.m.	51	104	20, a.m.	32	64	3,725	5.0†	745	31.0
V	20, p.m.	32	95	24, a.m.	32	64	2,050	3.5	586	24.4
VI	22, a.m.	38	122	24, a.m.	47	123	725	2.0	362	15.1
VII	30, a.m.	41	105	2, p.m.*	44	70	1,800	3.5	514	21.4
Sums	......	....	.....	......	....	.....	13,925	21.5	4,470	186.2
Mean of 7 paths	......	....	.....	......	....	.....	1,989	.....	639	26.6
Mean of 21.5 days	......	....	.....	......	....	.....	......	.....	648	26.9
Low areas.										
I	1, a.m.	54	114	6, a.m.	46	60	2,950	5.0	590	24.6
	3, p.m.	40	105				2,900	2.5	1,160	48.3
II	1, a.m.	30	90	2, p.m.	35	76	1,275	1.5	850	35.3
III	6, p.m.	48	123	9, a.m.	39	87	1,850	2.5	740	30.8
IV	8, p.m.	35	102	13, a.m.	48	54	2,900	4.5	644	26.8
V	9, a.m.	49	123	16, a.m.	41	72	3,100	7.0†	443	18.5
VI	17, p.m.	44	103	19, a.m.	26	98	1,350	1.5	900	37.5
				22, a.m.	48	69	2,600	4.5	578	24.1
	20, p.m.	37	79	......	....	.....	1,000	1.5	667	27.8
VII	21, a.m.	33	115	30, a.m.	45	64	3,225	9.0	358	14.9
	21, p.m.	50	110				2,975	8.5	350	14.6
	25, p.m.	32	91				1,750	4.5	389	16.2
VIII	26, p.m.	32	100	28, p.m.	35	75	1,425	2.0	712	29.7
IX	28, a.m.	34	112	4, p.m.*	41	71	3,500	7.0	500	20.8
Sums	......	....	.....	......	....	.....	32,800	61.5	8,881	369.9
Mean of 14 paths	......	....	.....	......	....	.....	2,343	.....	634	26.4
Mean of 61.5 days	......	....	.....	......	....	.....	......	.....	533	22.2

* April. † Stationary for 1 day.

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Division.

The following extracts relating to the general weather conditions in the several States and Territories are taken from the monthly reports of the respective sections of the Climate and Crop Service. The name of the section director is given after each summary.

Precipitation is expressed in inches and temperature in degrees Fahrenheit.

Alabama.—The mean temperature was 53.2°, or 2.0° below normal; the highest was 84°, at Florence on the 3d, and the lowest, 11°, at Oneonta and Riverton on the 7th. The average precipitation was 6.30, or 0.18 above normal; the greatest monthly amount, 10.14, occurred at Ashville, and the least, 1.39, at Livingston.

Farm work was almost entirely interrupted by excessive rains during the last few days, which caused overflows in nearly all the larger rivers, inundating much prepared land.—*F. P. Chaffee.*

Arizona.—The mean temperature was 54.8°, or 1.2° below normal; the highest was 95°, at Sentinel on the 1st, and the lowest, 5° at Flagstaff on the 31st. The average precipitation was 0.52, or 0.43 below normal; the greatest monthly amount, 1.89, occurred at Camp Creek, while none fell at a number of stations.—*W. G. Burns.*

Arkansas.—The mean temperature was 51.5°, or 0.5° above normal; the highest was 86°, at Conway and Spielerville on the 2d, and the lowest, 4°, at Pond on the 6th. The average precipitation was 4.67, or 0.25 below normal; the greatest monthly amount, 7.32, occurred at Ozark, and the least, 2.45, at Arkansas City.

Good progress has been made in all kinds of farm work during the month; early potatoes and some oats and corn have been planted; land is being prepared for cotton; wheat and oats continue to do well generally; the damage to fruit by frost has been slight.—*E. B. Richards.*

California.—The mean temperature was 53.0°, or 2.1° above normal; the highest was 95.0°, at Volcano on the 1st and at Salton on the 6th, and the lowest, 14° below zero, at Bodie on the 13th. The average precipitation was 1.01, or 2.32 below normal; the greatest monthly amount, 7.02, occurred at Crescent City, while none fell at 10 stations.

Conditions were unusually favorable for all crops during March. The temperature was slightly above normal, and no injurious frosts occurred. Light rain fell throughout the State, benefiting grain and grass, and softening the surface soil, which in some sections had become crusted. Wheat was in excellent condition at close of month, and deciduous fruits were developing rapidly.—*Alexander G. McAdie*

Colorado.—The mean temperature was 34.7°, or about normal; the highest was 86°, at Lamar on the 2d, and the lowest, 12° below zero, at Wagon Wheel Gap on the 30th. The average precipitation was 1.35, or about normal; the greatest monthly amount, 5.41, occurred at Ruby, and the least, 0.04, at Durango.

The concensus of opinion seems to be that the season is from 10 to 20 days late. The soil is generally in good condition, and some plowing and seeding have been done. Winter wheat is in good condition in the districts where water was available for irrigation last fall. Fruit trees wintered well in nearly all sections and the outlook for a good crop is favorable.—*F. H. Brandenburg.*

Florida.—The mean temperature was 62.1°, or 3.3° below normal; the highest was 91°, at Nocatee on the 25th and De Land on the 31st, and the lowest, 21°, at Quincy on 7th. The average precipitation was 5.65, or 2.57 above normal; the greatest monthly amount, 11.23, occurred at Carrabelle, and the least, 1.65, at New Smyrna.

Heavy rains during the second and third decades retarded farm work, and low temperatures during the first and second decades damaged vegetables as far south as central counties. Freezing conditions obtained throughout the north half of the State. A great deal of corn has been worked the first time, and considerable cotton has been planted on uplands. Citrus trees and pineapples are vigorous. Farm work is about two weeks late.—*A. J. Mitchell.*

Georgia.—The mean temperature was 53.6°, or 2.0° below normal; the highest was 86°, at Waycross on the 25th and at Fitzgerald on the 30th, and the lowest, 6°, at Dahlonega on the 6th and 7th; the average precipitation was 6.18, or 1.10 above normal; the greatest monthly amount, 9.17, occurred at Rome, and the least, 2.34, at Savannah.

Violent electrical disturbances and local windstorms occurred on the 25th and 26th, causing considerable property damage and some loss of

life. During the first and second decades the weather was particularly favorable for preparation of soil, but the excessive rains of the third decade damaged land by inundation, rotted seed in the ground, and put a stop to all farm operations.—*J. B. Marbury*.

Idaho.—The mean temperature was 36.2°, or 0.7° above normal; the highest was 72°, at Hagerman and Garnet on the 21st, and the lowest, 16° below zero, at Lake on the 28th. The average precipitation was 1.31, or 0.19 below normal; the greatest monthly amount, 3.91, occurred at Murray, and the least, 0.15, at Oakley.

A heavy rain on the 1st of March over the west slope of the Cœur D'Alene Mountains caused the St. Joseph River to rise suddenly and damaged loggers to the extent of about $1,000.—*S. M. Blandford*.

Illinois.—The mean temperature was 39.4°, or 1.3° above normal; the highest was 76°, at Raum on the 24th, and the lowest, 1° below zero, at Kishwaukee on the 5th. The average precipitation was 3.43, or 0.23 above normal; the greatest monthly amount, 7.30, occurred at Havana, and the least, 2.00, at Monmouth.

Mild weather during the month, and good but not excessive rains. Crops generally in a promising condition. Wheat looks well, but hessian fly is present in some localities. Excellent fruit prospect.—*M. E. Blystone*.

Indiana.—The mean temperature was 40.4°, or 1.2° above normal; the highest was 83°, at Crawfordsville on the 21st, and the lowest, 1° below zero, at Angola on the 6th. The average precipitation was 3.40, or 0.50 below normal; the greatest monthly amount, 5.42, occurred at Bloomington, and the least, 1.10, at Topeka.

Stormy, cloudy weather prevailed during March, with moderate temperature and frequent, but not very heavy, rains. Near the end of the month the snow had disappeared from northern fields. Wheat was improved much by the rains and looks green and vigorous, although thin in some fields; some of the early sown shows effect of injury done by the hessian fly. Rye is in fine condition everywhere. Clover wintered well; the young clover looks especially well; most of the new clover and timothy were sown this month. Meadows and pastures began to grow and look green. Some garden truck was sown and planted in a few localities. Many tobacco beds have been made in Switzerland County. Some early potatoes were planted in a few fields. Farm work was delayed, the ground being too wet for plowing and seeding, but in the southern half of the State some oats were sown and some plowing for corn was done. Fruit is apparently all safe and uninjured by frost; in the southern portion the buds began to swell. Livestock is in very good, healthy condition, with plenty of feed.—*C. F. R. Wappenhans*.

Iowa.—The mean temperature was 34.2°, or 1.0° above normal; the highest was 76°, at Atlantic on the 17th, and the lowest, 8° below zero, at Denison on the 4th. The average precipitation was 2.64, or 0.89 above normal; the greatest monthly amount, 5.25, occurred at Red Oak, the least, 0.70, at Whitten.

Frequent storms of snow, sleet, and rain hindered farm operations in nearly all parts of the State. In the northwest district, and on sandy soil in the east-central district a beginning was made in seeding during the month. Conditions were generally favorable for grasses and winter grain, which were practically uninjured during the winter. —*John R. Sage*.

Kansas.—The mean temperature was 42.5°, or 0.9° above normal; the highest was 89°, at Colby on the 7th, and the lowest, zero, at Colby on the 31st. The average precipitation was 1.71, or 0.32 above normal; the greatest monthly amount, 5.04, occurred at Oswego, and the least, 0.16, at Rome.

A changeable temperature, frequently dropping low enough to stop germination. Wheat continued in good condition over the larger part of the State, and in the extreme northwest the wheat in the ground sprouted. Some oats sown in nearly all parts; nearly completed in south. But little plowing this month. Corn planting just beginning south. Fruit buds unhurt. Apricots blossoming in south. Peaches nearly ready to blossom.—*T. B. Jennings*.

Kentucky.—The mean temperature was 46.4°, or 0.4° above normal; the highest was 87°, at Williamsburg on the 22d, and the lowest, 3°, at Catlettsburg, Loretto, and Shelby. The average precipitation was 3.50, or 1.79 below normal; the greatest monthly amount, 5.98, occurred at Hopkinsville, and the least, 1.95, at Catlettsburg.

Wheat suffered severely from lack of snow protection during the winter, and although it improved considerably during the last ten days in March, the outlook is very unsatisfactory. Tobacco beds all sown. Grass backward and clover badly winter killed. Oat sowing about completed and plowing for corn well advanced. No damaging frosts so far, and outlook for fruit very promising. Farm work generally well advanced.—*H. B. Hersey*.

Louisiana.—The mean temperature was 58.4°, or 2.0° below normal; the highest was 87°, at Rayne on the 31st, and the lowest, 19°, at Plain Dealing on the 6th. The average precipitation was 3.51, or 1.11 below normal; the greatest monthly amount, 6.22, occurred at Lake Providence, and the least, 2.02, at Grand Coteau.

Frost occurred more frequently and later than is usual for the month of March. Peaches were injured slightly; the ripening of early strawberries and maturing of early vegetables was retarded; otherwise, weather conditions were favorable for agricultural interests. Sugar cane, both plant and stubble, was in a satisfactory condition, off-barring, shaving, and scraping completed on most plantations. The planting of corn and early potatoes was about finished in the southern portion of the State, was well under way in the central portion, and had begun in the northern portion. The preparation of ground for rice and cotton was well advanced and planting was in progress. Fall planted oats were reported as looking well. Daily shipments of strawberries were being made from Tangipahoa Parish, but were not so large as usual at this season.—*W. T. Blythe*.

Maryland and Delaware.—The mean temperature was 42.7°, or 1.9° above normal; the highest was 88°, at Receiving Reservoir, D. C., on the 20th, and the lowest, 9° below zero, at Sunnyside, Md., on the 6th. The average precipitation was 3.47, or 0.23 below normal; the greatest monthly amount, 6.99, occurred at Bachman's Valley, Md., and the least, 1.13, at Johns Hopkins Hospital, Md.

The early part of March was cold, but later in the month warmer weather favored growth, and copious rains were very beneficial, greatly improving the condition of winter grain and grasses. Very little farm work of any kind was accomplished during the month in the more western counties, and less than the usual progress had been made in the northern-central counties. Farther south about average advance had been made, with oats, peas, and potatoes, in the ground in places, and fruit buds swelling generally. Outlook more favorable than a month ago.—*Oliver L. Fassig*.

Michigan.—The mean temperature was 28.0°, or 0.8° above normal; the highest was 72°, at Adrian on the 25th, and the lowest, 20° below zero, at Lake City on the 3d and at Humboldt on the 6th. The average precipitation was 2.65, or 0.31 above normal; the greatest monthly amount, 5.32, occurred at Charlevoix, and the least, 0.68, at Eagle Harbor.—*C. F. Schneider*.

Minnesota.—The mean temperature was 27.3°, or 3.5° above normal; the highest was 65°, at Luverne on the 17th and at St. Cloud on the 30th, and the lowest, 28° below at New Folden and Pokegama on the 5th. The average precipitation was 1.68, or 0.25 above normal; the greatest monthly amount, 4.17, occurred at Grand Meadow, and the least, 0.20, at Crookston.

No work in the soil was possible except a little harrowing and wheat seeding on the high and light lands of Chippewa, Rock, Nobles, Redwood, and Blue Earth counties from the 16th to the 23d, after the surface soil was thawed a little. Frost was in the ground to a considerable depth, with freezing temperatures almost nightly, but toward the end of the month the surface soil was thawing during the afternoons. There is abundant soil moisture. Much plowing is to be done this spring in portions of the Red River Valley, because of the excessive rainfall last autumn.—*T. S. Outram*.

Mississippi.—The mean temperature was 55.2°, or 1.4° below normal; the highest was 84°, at Poplarville on the 28th and at Brookhaven on the 29th, and the lowest, 16°, at Ripley on the 6th. The average precipitation was 3.62, or 2.20 below normal; the greatest monthly amount, 5.60, occurred at Woodville, and the least, 1.55, at Okolona.

The average rainfall, although next to the lightest during past fourteen years, was well distributed over the State and throughout the month. Farm work was in splendid condition in the northern portion of the State, but truck gardening was somewhat delayed in the southern counties on account of continued cool weather. Fruit prospect excellent.—*W. S. Belden*.

Missouri.—The mean temperature was 42.5°, or 1.0° above normal; the highest was 85°, at Wylie on the 2d, and the lowest, 1° below zero, at Potosi on the 6th. The average precipitation was 3.73, or 0.46 above normal; the greatest monthly amount, 6 28, occurred at Boonville, and the least, 1.96, at Hazlehurst.

The weather was very changeable; high winds prevailed a considerable part of the time, and the month was, on the whole, the most disagreeable of the winter. In a number of the southeastern and a few of the east-central and southwestern counties the ground was in good condition to work, and the greater part of the oat crop was sown, early potatoes were planted, and considerable ground prepared for corn, but throughout the remainder of the State the soil was wet and cold and little or no farm work was done. Wheat and clover suffered but little injury from freezing and thawing and were generally in excellent condition at the close of the month.—*A. E. Hackett*.

Montana.—The mean temperature was 34.5°, or 6.7° above normal; the highest was 72°, at Miles City on the 17th, and the lowest, 20° below zero, at Chester on the 4th. The average precipitation was 0.71, or 0.26 below normal; the greatest monthly amount, 2.69, occurred at Columbia Falls, and the least, trace, at Glasgow, Poplar, and Ridgelawn.—*E. J. Glass*.

Nebraska.—The mean temperature was 35.7°, or 1.7° above normal; the highest was 87°, at Beaver City on the 2d, and the lowest, 8° below zero, at Lynch on the 5th. The average precipitation was 1.90, or 0.74 above normal; the greatest monthly amount, 4.46, occurred at Stratton, and the least, 0.40, at Whitman.

The warm, wet weather has been very favorable for all fall-sown grain, but has delayed farm work. Wheat and rye are in unusually fine condition.—*G. A. Loveland*.

Nevada.—The mean temperature was 38.9°, or 1.7° above normal; the highest was 90°, at Lovelock on the 15th, and the lowest, zero, at

Potts on the 24th. The average precipitation was 0.59, or 0.63 below normal; the greatest monthly amount, 2.52, occurred at Lee, while none fell at Humboldt.

The first half of the month was warm and springlike; last half was cold, typical March weather. Some plowing and seeding in various parts of the State. Fruit trees blooming early in month.—*J. H. Smith.*

New England.—The mean temperature was 31.5°, or 0.5° above normal; the highest was 64°, at Bennington, Vt., on the 26th, and the lowest, 24° below zero, at Enosburg Falls, Vt., on the 2d. The average precipitation was 5.43, or 1.91 above normal; the greatest monthly amount, 10.30, occurred at Bar Harbor, Me., and the least, 1.17, at Cornwall, Vt.

Excessive precipitation, generally in the form of rain; no destructive or severe storms. Maple sugar a short crop. Some plowing and gardening has been done in Rhode Island and Connecticut at close of month. According to general estimate the season is ten days behind.—*J. W. Smith.*

New Jersey.—The mean temperature was 39.2°, or about normal; the highest was 75°, at Bridgeton and Salem on the 19th, and the lowest, 8° below zero, at Layton on the 7th. The average precipitation was 4.64, or 0.75 above normal; the greatest monthly amount, 8.07, occurred at Charlotteburg, and the least, 2.40, at Mount Pleasant.

The weather was favorable for farming operations in the southern portion, where much plowing has been done and the seeding of oats begun; some hardy truck has been planted. Winter grain in all sections injuriously affected by absence of snow protection. All fruit trees wintered well; buds abundant but still dormant in northern portion.—*E. W. McGann.*

New Mexico.—The mean temperature was 42.8° or 1.8° below normal; the highest was 90°, at San Marcial on the 2d and 6th, and the lowest, 7°, at Winsors on the 14th and 20th. The average precipitation was 0.49, or 0.03 above normal; the greatest monthly amount, 1.83, occurred at Folsom, while none fell at Roswell and San Marcial, and only trace at Olio.

High, cold winds; backward month. In the north vegetation delayed; early blooming fruits, such as peaches, apricots, plums, and cherries, greatly injured by the cold in the southern half of Territory.—*R. M. Hardinge.*

New York.—The mean temperature was 30.6°, or 1.4° above normal; the highest was 64°, at Mohonk Lake on the 4th, Oneonta on the 25th, and Lockport on the 26th, and the lowest, 28° below zero, at Axton on the 3d. The average precipitation was 3.51, or 0.33 above normal; the greatest monthly amount, 7.89, occurred at Carmel, and the least, 0.85, at Hemlock Lake.

Low temperatures characterized the first week of March, the 6th being one of the coldest days of the winter. From this time until the 27th the temperature was generally above normal, and the third week was unusually warm. The precipitation exceeded the usual amount, and was well distributed through the month. At the opening of March the ground was heavily covered with snow, but little remained after the 20th, excepting in the northern section. Vegetation and farm work made little advance, owing to frost and moisture in the ground.—*E. T. Turner.*

North Carolina.—The mean temperature was 50.5°, or 2.0° above normal; the highest was 81°, at Kinston on the 25th, and the lowest, zero, at Linville on the 6th. The average precipitation was 4.71, or 0.07 above normal; the greatest monthly amount, 10.14, occurred at Horse Cove, and the least, 2.05, at Currituck Inlet.

The severe freeze early in March killed some winter wheat, and the outlook for that crop was not promising until the heavy rains of the 25th, which compacted the soil about the roots and started rapid growth. Oats, rye, and clover, were also benefited. During the first half of March farmers made excellent progress in preliminary farm work. Truck crops and strawberries in the east were from one to two weeks later than usual; some shipments of radishes and lettuce were made near the close of the month.—*C. F. von Herrmann.*

North Dakota.—The mean temperature was 25.3°, or 7.7° above normal; the highest was 85°, at Fort Yates on the 18th, and the lowest, 32° below zero, at Woodbridge on the 4th. The average precipitation was 0.86, or 0.08 below normal; the greatest monthly amount, 1.99, occurred at Wahpeton, and the least, 0.06, at Church Ferry.—*B. H. Bronson.*

Ohio.—The mean temperature was 39.5°, or 1.0° above normal; the highest was 84°, at Portsmouth on the 25th, and the lowest, 8° below zero, at Colebrook on the 6th. The average precipitation was 2.66, or 0.71 below normal; the greatest monthly amount, 5.20, occurred at Rittman, and the least, 0.80, at Frankfort.

The temperature ranges have been great and the changes frequent, but at the close of the month fruit is practically uninjured; grass fields and meadows, though backward, show very little winter damage. The condition of wheat is reported to be from fair to very good over the northwestern three-fourths of the State, but in the southeast it is very poor. Farm work was backward at the close of March.—*J. Warren Smith.*

Oklahoma and Indian Territories.—The mean temperature was 49.7°, or 0.2° above normal; the highest was 90°, at Pawhuska on the 2d, and the lowest, 7°, at Jefferson on the 6th. The average precipitation was 1.53, or 0.50 below normal; the greatest monthly amount, 5.10, occurred at Bengal, and the least, trace, at Colbert.

During the month conditions were generally favorable for growing crops. Wheat generally is in fair condition; oats were all sown during the month and coming up with a fair stand. Recent rains are causing small grain to make good growth, and have placed ground in good working condition. Corn is being planted, and cotton land broken; grass is starting up; fruit trees are blooming, with a fine prospect. A severe local storm occurred over Washita County on the 29th, doing considerable damage to property and causing loss of life.—*Charles M. Strong.*

Oregon.—The mean temperature was 44.6°, or 1.1° above normal; the highest was 81°, at Hare on the 5th, and the lowest, 10° at Silverlake on the 23d. The average precipitation was 3.92, or 0.23 below normal; the greatest monthly amount, 11.50, occurred at Glenora, and the least, 0.14, at Riverside.

Vegetation at the close of March, 1901, was not as far advanced as it was at the same time last year; the backwardness of the season being due to an unusually prolonged cool spell which began on the 21st, and continued until the close of the month. The crop outlook, however, is promising, and the fall sown wheat has come through the winter uninjured, well rooted and stooled, and it has a thrifty appearance and good color. Fruit trees wintered well, and at the close of the month peaches, apricots, and some of the earliest varieties of cherries and prunes were in full bloom, and although light frosts frequently occurred during this time no damage from them has so far been reported.—*Edward A. Beals.*

Pennsylvania.—The mean temperature was 37.4°, or 2.0° above normal; the highest was 80°, at Franklin on the 19th, and the lowest, 11° below zero, at Saegerstown on the 1st. The average precipitation was 4.14, or 0.61 above normal; the greatest monthly amount, 7.21, occurred at Somerset, and the least, 1.52, at Aleppo.

Soaking rains, seasonable temperature, and much sunshine gave vegetation an early start. Grain, wheat, and rye look to be in good condition in all sections of State. Plowing in southern counties was commenced in latter part of month.—*L. M. Dey.*

Porto Rico.—The mean temperature was 75.7°, or 0.4° above normal; the highest was 97°, at Bayamon on the 3d, and the lowest, 52°, at Corozal on the 13th. The average precipitation was 6.53, or 3.60 above normal; the greatest monthly amount, 12.58, occurred at Manati, and the least, 0.88, at Ponce.

Dry weather at the opening of March retarded farming operations, but much farm work was done during the month. The heavy rains during the middle of March, which were torrential in some localities on the 17th and 18th, damaged small crops and caused some of the rivers to overflow and inundate much low land. The wet weather was favorable for young canes, but retarded grinding. Cane is maturing fairly well and the saving of the crop is being hastened. The density of the juice has slightly improved, but continues below the normal. The quality and quantity of the crop is not as good as was anticipated. Tobacco cutting continues, but is nearing completion in places. Coffee trees are full of blossoms, now blooming the third time, and an excellent yield is promised. Small crops, such as beans, tomatoes, lettuce, cabbage, carrots, sweet potatoes, oranges, bananas, pineapples, pepper, turnips, tamarindos, squashes, malangos, cocoanuts, etc., are being marketed. The yield of some of these products is good. Some new crops are being planted.—*Joseph L. Cline.*

South Carolina.—The mean temperature was 53.4°, or 1.3° below normal; the highest was 86°, at Gillisonville on the 25th, and the lowest, 10°, at Liberty on the 7th. The average precipitation was 4.36, or 0.80 above normal; the greatest monthly amount, 8.68, occurred at Greenville and Liberty, and the least, 2.27, at Pinopolis and Yemassee.

There was more than the usual amount of land prepared for planting, and less than the usual amount of planting accomplished, owing to heavy rains during the last ten days. Killing frosts were general on the 6th, 7th, 17th, and 22d, but vegetation was so backward that no injury resulted.—*J. W. Bauer.*

South Dakota.—The mean temperature was 32.4°, or 6.0° above normal; the highest was 79°, at Fort Randall and Yankton on the 17th, and at Oelrichs on the 21st, and the lowest, 16° below zero, at La Delle on the 5th. The average precipitation was 0.89, or 0.61 below normal; the greatest monthly amount, 2.60, occurred at Rosebud, and the least, 0.05, at Ipswich.

A heavy snowstorm over the extreme western portion of the State on the 24th and 25th interrupted railway traffic, rendered wagon roads impassable for several days in some parts, and caused some loss of live stock in localities. At the close of the month spring wheat seeding was progressing fairly well in the southern, and had begun in the middle counties, having previously been frequently interrupted and delayed by freezing weather and rain or snow. The soil is amply moist generally. Winter rye is reported in good condition.—*S. W. Glenn.*

Tennessee.—The mean temperature was 49.2°, or 0.3° above normal; the highest was 82°, at Nunnelly on the 3d, Johnsonville on the 4th, and at Liberty on the 5th, and the lowest, zero, at Rugby on the 6th. The average precipitation was 4.10, or 1.53 below normal; the greatest monthly amount, 8.46, occurred at Chattanooga, and the least, 1.30, at Springfield.

Wheat was small and backward at the close of the month, but had made rapid improvement in condition, especially in the middle and western divisions. The work of sowing oats and breaking and preparing land for corn and cotton was about finished and a considerable acreage in corn was planted. Irish potatoes were planted and gardening was well advanced.—*H. C. Bate.*

Texas.—The mean temperature was 58.6°, or 0.3° below normal; the highest was 103°, at Fort Ringgold on the 9th, and the lowest, 12°, at Anna on the 6th and Haskell on the 10th. The average precipitation was 1.43, or 0.58 below normal; the greatest monthly amount, 5.44, occurred at Arthur City, while none fell at Eagle Pass, Fort Brown, and Sanderson.

Except in the eastern portion of the State, where the rainfall was sufficient for agricultural purposes, the weather conditions were generally unfavorable for farming interests. At the close of the month rain was badly needed over the western portion of the State for all interests. Wheat and oats suffered for the want of rain, and insects damaged these crops seriously in many localities. The bulk of the corn crop was planted, but good stands were not secured in all sections. Good progress was made in the preparation of land for cotton, but the majority of farmers are waiting for good rains before planting. Trucking interests suffered generally on account of the dry weather. The strawberry crop was cut short. A good acreage has been planted to sugar cane. Preparations are being made for a large rice crop.—*I. M. Cline.*

Utah.—The mean temperature was 36.8°, or 1.1° below normal; the highest was 78°, at Moab on the 2d and at St. George on the 6th, and the lowest, 2° below zero, at Soldier Summit on the 30th. The average precipitation was 0.84, or 0.48 below normal; the greatest monthly amount, 3.15, occurred at Park City, while none fell at Kanab.—*L. H. Murdoch.*

Virginia.—The mean temperature was 46.6°, or 3.0° above normal; the highest was 83°, at Ashland on the 26th, and the lowest, 3° below zero, at Burkes Garden on the 6th. The average precipitation was 3.49, or 0.43 below normal; the greatest monthly amount, 5.73, occurred at Callaville, and the least, 1.29, at Manassas.

Favorable conditions of temperature and moisture prevailed, and winter grains, which had been suffering from drought and were backward, made excellent growth and at the close of the month were nearly normal in condition.—*Edward A. Evans.*

Washington.—The mean temperature was 42.5°, or 2.1° above normal; the highest was 84°, at Dayton on the 21st, and the lowest, 16° at Republic on the 5th. The average precipitation was 2.59, or 0.34 below normal; the greatest monthly amount, 10.40, occurred at Monte Cristo, and the least, 0.06, at Ritzville.

The first three weeks were very mild and favorable but the cool and wet character of the last week of the month was unfavorable for spring work and the growth of crops, making the spring late and crops backward—*G. N. Salisbury.*

West Virginia.—The mean temperature was 42.9°, or 0.5° above normal; the highest was 83°, at Point Pleasant on the 24th, and the lowest, 11° below zero, at Terra Alta on the 6th. The average precipitation was 3.23, or 0.56 below normal; the greatest monthly amount, 5.27, occurred at Harpers Ferry, and the least, 0.90, at Parsons.

Practically no snow protection and almost constant freezing and thawing, but wheat generally reported in fair condition; considerable late sown winter-killed and some plowed up; farm work well advanced; some oats being sown and gardens made; some potatoes, onions, and peas already planted; just cold enough to retard budding, and fruit prospects excellent; cattle and sheep wintered fairly well, but feed getting scarce.—*E. C. Vose.*

Wisconsin.—The mean temperature was 28.1°, or about normal; the highest was 64°, at Grantsburg on the 16th, and the lowest, 38° below zero, at Butternut on the 6th. The average precipitation was 2.85, or 1.00 above normal; the greatest monthly amount, 5.15, occurred at Port Washington, and the least, 1.55, at West Bend.

A very damaging sleetstorm occurred on the 10th. The telephone and telegraph wires became so burdened by the accumulation of ice that hundreds of miles of wire in the southern portion of the State were borne to the ground, and Milwaukee was practically cut off from the outside world for nearly forty-eight hours. No progress has been made in farm work, the ground being still frozen in many portions of the State.—*W. M. Wilson.*

Wyoming.—The mean temperature was 30.3°, or 1.2° above normal; the highest was 70°, at Buffalo on the 1st, and the lowest, 10° below zero, at Daniel on the 30th and 31st. The average precipitation was 0.87, or 0.49 below normal; the greatest monthly amount, 2,45, occurred at Saratoga, and the least, trace, at Hyattville and Basin.

The mild weather of March allowed some plowing and seeding to be done over some parts of northern Wyoming.—*W. S. Palmer.*

Cuba.—The mean temperature was 73.7°; the highest was 98°, at Holguin on the 23d, and the lowest, 42°, at Batabano on the 18th. The average precipitation was 1.42; the greatest monthly amount, 2.94, occurred at Soledad (Guantanamo), and the least, 0.15, at Holguin.

The precipitation was light but fairly well distributed; it caused very few interruptions in cane harvest, and grinding continued throughout the month. Preparations of soil for spring cane planting was generally and actively carried on; planting is under way at scattered points. New canes and stubble did not receive sufficient rain but they very satisfactorily withstood the effects of the dry weather. The tobacco harvest was finished in Pinar del Rio and western Havana during the first fifteen days of the month; the yield was short but the quality is considered very good; the weather was too dry to admit of handling the crop and but little selecting was under way at the end of the month. Tobacco in Santa Clara improved greatly and yield and quality will prove better than anticipated. Rainfall was entirely too light for small crops, especially in Pinar del Rio. Quite seasonable temperature prevailed.—*Wm. B. Stockman.*

SPECIAL CONTRIBUTIONS.

FOG STUDIES ON MOUNT TAMALPAIS: NUMBER 4.[1]

By ALEXANDER G. MCADIE, Forecast Official, dated January 25, 1901.

REFRACTION OF SOUND WAVES BY FOG SURFACES.

In a previous paper the aberration of the zones of audibility of fog signals was briefly referred to in connection with the fog billows formed at the common surface of air streams of different temperatures and densities. Some photographs of these Helmholtzian air billows, or rather of the vapor masses which serve as exponents of the air waves, were given, and the question of the reflection and interference of sound waves in the vicinity of Mount Tamalpais briefly alluded to. In the present paper some additional photographs showing rather remarkable curved surfaces of the condensed water vapor are given.

The velocity of sound, it is generally stated, is within wide limits practically independent of both intensity and pitch. In dry air at 0° C., according to Rowland, the velocity of sound propagation is 331.78 meters (1,090 feet) per second. In water vapor at 10° C., according to Masson, the velocity is about 402 meters (1,318 feet), and at 96° C. 410 meters (1,345 feet) per second. In water at 10° C. the velocity is about 1,435 meters (4,708 feet); in copper about 3,560 meters and in glass from 5,000 to 6,000 meters.

The velocity is proportional to the square root of the absolute temperature, as given by the formula,

$$a = a_0\sqrt{1 + \frac{\theta'}{273}}$$

where a = velocity of sound
a_0 = velocity of sound at 0° C.

The velocity of sound propagation in dry air is therefore about 37 times more rapid than that of the average summer afternoon winds (20 miles per hour), which blow through the Golden Gate with such regularity and which are the prime disturbing factors in the circulation of the air in this vicinity. The question of refraction of sound in free air has been independently studied by Stokes[2], Taylor[3], Henry[4], Tyndall[5], and Reynolds[6], and many of the puzzling phenomena connected with the aberration of sound can be demonstrated to be caused by the bending of the sound beams in traversing air strata of varying temperatures and motions. The most efficient cause of loss of audibility is

[1] The Editor regrets that the publication of this article, written before the loss of the steamship *Rio de Janeiro*, has been delayed by waiting for the half-tone plates.

[2] Report British Association, 1857. [3] Smithsonian Report, 1875. [4] Smithsonian Report, 1877. [5] Philosophical Transactions, 1874. [6] Philosophical Transactions, 1876.

wind. The loss is not due to an actual retardation of the sound waves by the movement of the air so much as to a refraction of the wave front upward from the earth. Sound traveling with the wind is bent downward, and traveling against the wind is bent upward. Knowing this, we are able, by lifting the position of the hearer, sometimes to make sound audible against the wind. Thus Henry shows that a sound moving against the wind, inaudible to the ear on the deck of a vessel, could be heard at the masthead. Reynold's experiments even more conclusively demonstrate the bending of the wave front downward as a rule when moving with the wind, and upward when moving against the wind.

The accompanying photographs, Plate I, figs. 1 and 2, show air strata moving with varying velocities. As a rule the upper currents have the greater velocity, but not infrequently this condition may be reversed. In such cases audibility should be favored, even by an opposing wind. And this is sometimes found to be the case. Thus far we have alluded only to the refraction of the wave fronts due to varying air velocities. But the varying temperatures of the different air masses will also affect the relative audibility. Reynolds instances a marked case, where owing to a thorough cooling of the lower air strata, and presumably a marked inverted temperature gradient, the audibility was excellent, the sound being refracted downward, and all objects "looming" as it were. It is even possible to work out the retardation or acceleration of the wave front with the degree of variation in temperature. Finally, it may be that the temperature and the air motion may act together to refract downward the sound wave, and it may also happen that the one influence may oppose the other. Thus Reynolds gives an example where, with a heavy dew on the ground, sound could be heard equally well against a light wind as with the wind,

Showing that the upward refraction by the wind was completely counteracted by the downward refraction from the diminution of temperature. This was observed not to be the case when cloudiness at night prevented terrestrial radiation. (Proc. R. S., 1874.)

The presence of large quantities of condensed water vapor brings us to the question of refracting surfaces, and the reverberation of the sound rather than its velocity.

When a sound wave travels over a perfectly smooth surface such as a glassy sea, or a sharply outlined plane of condensation, the intensity of the sound does not diminish with the usual rapidity. In discussing the propagation of sound in whispering galleries, Rayleigh[7] shows that the abnormal loudness is not confined to a point diametrically opposite that occupied by the speaker, but that there is a bending or clinging of the sound waves to the surface of the concave wall. Sonorous vibrations at fog surfaces and cloud surfaces may behave in a somewhat similar way, and it is probable that the curvature of the surface is not of as great importance as the comparative smoothness of the surface. Probably the roll of thunder is an excellent illustration of continued reverberation at cloud surfaces.

DISSIPATION OF FOG.

Our discussion of fog phenomena will be incomplete without some reference to the question of the dissipation of fog. What is greatly needed, however, is a systematic study of the various methods known to be effective in dissipating or scattering fog particles. Dr. Lodge has pointed out a number of different methods by which dust can be removed from the air, and it is now generally believed that by removing dust the essential nuclei of condensation are removed. The various methods may be briefly described as filtering, settling, recondensing, calcining, and electrifying. Of all these the last mentioned seems to offer most in connection with the problem of fog dissipation. To dissipate the fog, we can either by gentle electrification increase the size of the dust nuclei or, under strong electrical discharges, rupture and precipitate the same. In one of Dr. Lodge's lectures before the British Association at Montreal occurred the following pointed reference to fog dissipation:

It seems not impossible that some use may be made of this aggregating power of electricity on small bodies, such as smoke particles and mist globules. In coming to this country, we lay for some hours outside the Straits of Belle Isle in the midst of icebergs mingled with fog. Icebergs alone are not dangerous, but beautiful. Fog is an unmitigated nuisance. Electric light is powerless to penetrate it; and it was impossible, as we lay there idle, not to be struck with the advisability of dissipating it. It is rash to predict what can not be done. I would merely point out that on board a steamer are donkey engines [Dr. Lodge could now add dynamos and the means of generating powerful currents of electricity] and that these engines can drive a very powerful Holtz or Wimshurst machine, one pole of which may be led to points on the masts. When electricity is discharged into fog on a small scale, it coagulates into globules and falls as rain; perhaps it will on a large scale, too. Oil stills the ripples of a pond and it has an effect on ocean billows; just so an electric discharge, which certainly coagulates and precipitates smoke or steam in a bell jar, may possibly have an effect on an Atlantic fog. I am not too sanguine, but it would not cost much to try, and even if it only kept a fairly clear place near the ship it would be useful.

The author has elsewhere described certain experiments made at the top of the Washington Monument, Washington, D. C., wherein some noteworthy relations between flashes of lightning and the character of a stream of water issuing from the nozzle of a Thomson collector were described. Previous to each flash the jet would be twisted and split into many fine streams and sprays, but instantly with the occurrence of the flash the stream resumed its normal character. In this case many of the experiments of the laboratory were verified by experiments made under natural conditions.

The subject is certainly interesting enough to warrant further study. Lord Rayleigh has shown that remarkable effects are obtained by bringing a highly electrified body near a fine stream of water, and has stated[8] that—

There is a practical application in meteorology of these relations. The formation of rain must depend very materially upon the consequences of encounters between cloud particles. If encounters do not lead to contact, or if contacts result in rebounds, the particles remain of the same size as before; but if the issue be coalescence, the bigger drops must increase in size and be precipitated as rain.

In very recent years a theory advanced by T. C. R. Wilson in connection with the origin of atmospheric electricity has brought prominently into notice the efficiency of the ions as nuclei of condensation of water vapor. Wilson[9] finds that positive and negative ions (at least those produced in air by Röntgen rays) differ in efficiency as condensing nuclei. Elster and Geitel in their long series of papers upon atmospheric electricity have shown that normal air contains positive and negative ions in nearly equal quantities. Zeleny has shown that the negative ions move more rapidly. It is also known that in liquids the ions travel with the atoms, while in gases the ions appear to be free. In brief, the substance of the theory advanced by Elster and Geitel and elaborated by Wilson is that the ultraviolet rays of sunlight ionize the upper air strata, and owing to various causes the ions will in time distribute themselves somewhat as follows, the negative ions in the lower strata chiefly and the positive ions above. Water vapor will condense more rapidly on the negative than on the positive ions. The negative ions become centers of condensation with a less degree of supersaturation. Aitken has objected to the theory and raises the question as to whether the necessary supersaturation does occur in fact, and whether there is a sufficiently dust free atmosphere. Wilson thinks that the air may be purified of its dust by an ascensional movement. Aitken, however, thinks that when

[7] Theory of Sound, Vol. 2, Sec. 287.

[8] Proc. R. S., March 13, 1879. [9] Nature, March 29, 1900.

a cloud forms in ordinary impure air only a small proportion of the dust centers become active centers of condensation. He has counted on the Rigi Kulm as many as 4,000 dust particles per cubic centimeter in clouds and 7,700 in dense clouds, while in fog there are as many as 50,000. While it is not probable that the ions could cause the formation of cloud, they might give rise to rain. When the air is in a certain unstable condition any ion more active than others will grow rapidly and falling through highly saturated air will relieve the tension along its path, and we may thus have an active cause in the formation of a raindrop.

From all that precedes, it is evident that the processes at work in the formation of a raindrop are exceedingly intricate, but with a rapidly increasing knowledge of physical relationships it does not seem hopeless to undertake elaborate experiments to determine the active agencies in what may be called the field of collapse. At Mount Tamalpais, as we have tried to show, fog conditions are pronounced, saturated and supersaturated strata lie in close juxtaposition and seemingly are within reach of experimentation.

PRESSURE OF SATURATED AQUEOUS VAPOR AT TEMPERATURES BELOW FREEZING.

By Prof. MAX THIESEN, dated Friedrichshagen, January 12, 1899, from the Ann. dr Phys. u. Clem., March, 1899, vol. 67, pp. 690-695.

The following computations were made in order to investigate how far much more accurate determinations of the pressure of aqueous vapor than at present exist would be of interest at low temperatures. At first the temperature itself was determined, for which the difference in the pressures over water and over ice becomes a maximum, then the absolute pressures themselves for both cases were computed. Some of the relations that resulted in this work will not be without interest to others.

We first establish the equation of condition for the temperature when the maximum difference occurs; that such a maximum in general must occur follows from the fact that the difference between the two conditions over water and over ice is inappreciable both in the neighborhood of 0° C. and also at very low temperatures.

Let v_1 and v_2 be the volumes of the vapor and the fluid at the absolute temperature T; p the pressure of the saturated vapor in contact with the fluid; ρ the latent heat of evaporation of water; and let the corresponding quantities for ice be indicated by indices; then, according to Clapeyron and Clausius,

$$(1) \qquad (v_1 - v_2)\frac{dp}{dT} = \frac{\rho}{T};$$

$$(2) \qquad (v_1' - v_2')\frac{dp'}{dT} = \frac{\rho'}{T}$$

When the difference between the two vapor pressures is a maximum, the change or differential of $p - p'$ with respect to T becomes 0; consequently, at this point we have

$$(3) \qquad \frac{v_1' - v_2'}{v_1 - v_2} = \frac{\rho'}{\rho}.$$

An approximation that will be demonstrated hereafter is now introduced into the preceding rigorous formula by the assumption that, corresponding to the Marriott and Gay-Lussac law, we may assume—

$$(4) \qquad p\,(v_1 - v_2) = p'\,(v_1' - v_2') = R\,T.$$

The equations (1), (2), (3) now become—

$$(5) \qquad \frac{d \log p}{d\,T} = \frac{\rho}{R\,T^2}$$

$$(6) \qquad \frac{d \log p'}{d\,T} = \frac{\rho'}{R\,T^2}$$

$$(7) \qquad \frac{p}{p'} = \frac{\rho'}{\rho}$$

If, now, we indicate by T_0 the temperature, which lies only a little above 0° C., for which $p' = p$, then by the subtraction of (6) from (5), followed by integration, we have—

$$\log \frac{p}{p'} = -\int_{T_0}^{T} \frac{\rho' - \rho}{R\,T^2}\,d\,T$$

and by connecting this with equation (7) we have, finally:

$$(8) \qquad \log \frac{\rho'}{\rho} = -\int_{T_0}^{T} \frac{\rho' - \rho}{R\,T^2}\,d\,T$$

From this equation the location of the maximum can be determined with sufficient accuracy; to this end the individual quantities entering into the equation must be studied more closely.

The quantity $(\rho' - \rho)$ is the latent heat of liquefaction of ice; it may be designated by σ. The variation of this quantity with temperature and under constant pressure (as we may here assume without appreciable error) is given by the expression—

$$d\,\sigma = (C - C')\,d\,T$$

in case C and C′ are the specific heats of water and ice under constant and inappreciably small pressure.

The numerical values of σ, C and C' in the neighborhood of 0° C. are given in calories as follows:

$$(9) \qquad \sigma_0 = 79.9; \quad C = 1; \quad C' = 0.474;$$

hence the heat of liquefaction increases for each degree by 0.526 calories, or 0.0066 of its own value, or almost at the same rate as T^2; with a little greater accuracy we may write

$$(10) \qquad \frac{\sigma}{T^2} = \frac{\sigma_0}{T^2}(1 - 0.007\,t)$$

where we, for the sake of brevity, have put $t = T - T_0$. The right-hand side of equation (8) has, therefore, the value:

$$-\frac{\sigma_0}{R\,T_0^2}(1 - 0\,0004\,t)\,t.$$

In order to compute the quantity $\sigma_0/R\,T_0^2$, which occurs herein, we propose the two following methods:

(A). We convert the above value of σ_0 into mechanical units by multiplying it by 41.34, where the atmospheric pressure is considered as the unit of pressure and compute the value of R from the corresponding value for carbonic acid gas, as it results from Regnault's observations[1], after reduction with the latest values of the atomic weights. We thus obtain:

$$(11) \qquad \frac{\sigma_0}{R\,T_0^2} = \frac{79.9 \times 41.34 \times 0.2200}{273^2} = 0.00975.$$

(B.) By means of equation (5) we rewrite the expression just computed in the following form:

$$\frac{\sigma_0}{R\,T_0^2} = \frac{\sigma}{\rho} \times \left[\frac{d \log p}{d\,T} \text{ at } 0^\circ \text{ C.}\right]$$

We compute the value of ρ for the temperature 0° C., from the expression[2]

$$(12) \qquad \rho = r\,(\tau - T)^{1/3}$$

where[3] Log. $r = 1.9214$, $\tau - T_0 = 365$, whence $\rho_0 = 596.3$ (calorics.)

For the computation of the second factor I use the following equation:

[1] M. Thiesen. Wiedemann's Annalen. 1885. Vol. XXIV, p. 483.

[2] M. Thiesen Sitzungsb. d. Phys. Gesell. zu Berlin. 1897. Vol. XVI, p. 80.

[3] I uniformly designate the natural logarithms by log and the ordinary Briggian logarithms by Log.

$$(13) \qquad T \log p = 5.409\,(t-100) - 0.508 \times 10^{-8} \times \left\{ (365-t)^4 - 265^4 \right\}$$

in which t is measured from 0° C.

This equation, which only contains two constants to be determined from the observations of vapor tension, represents the best observations between 0° C. and 180° C. quite well; from it there follows:

$$\frac{d \log p}{d\,T} = 0.07268 \text{ at } 0° \text{ C.}$$

Hence we obtain by our second method the value:

$$\frac{\sigma_0}{R\,T_0^2} = \frac{79.9}{596.3} \times 0.07268 = 0.00974$$

The perfect agreement of this second with the preceding value demonstrates the applicability of the Avogadro law at 0° C. and makes quite probable the assumption of the applicability of Marriott's law, which was assumed in deducing equation (5).

The still remaining value of ρ' in equation (8) is the sum of ρ and σ for 0° C. and is equal to 676.2. Its variation with temperature at 0° C. is equal to $-0.545 + 0.526 = -0.019$ for each degree centigrade and can be neglected in the present problem. This is materially smaller than the change of the density of ice with temperature; a still greater constancy [in the change of ρ' with temperature] results from the agreement of the values of the specific heat of ice and vapor as observed by Regnault.

If now we sum up all our results we find that the equation of condition (8) takes such a form that t is a quantity that depends on quantities that vary slowly with t. Therefore we easily find for t an approximate value, and after computing for this approximate value the slowly varying quantities, we find the exact value of t. The execution of this computation gives the following:

$$(14) \qquad -t = \frac{\log \frac{676.2}{602.7}}{0.00975 \times 1.005} = 11.7°.$$

Consequently the extrapolation of the quantities that enter into the computation extends to a few degrees only, and the computed value can be considered as quite certain. Fischer, in his observations, had already come so near to this temperature[4] that he certainly would, at lower temperatures, have observed no appreciably greater difference between the tension of saturated vapor over ice and over water.

We now proceed to the attempt to compute the tensions themselves and first the tension of vapor over ice. From equation (6) by integration, considering the above found approximate constancy of ρ' as being perfect, there results

$$(15) \qquad \log \frac{p'}{p_0} = \frac{\rho'}{R\,T_0}\,\frac{t}{T}$$

and if we substitute the above found value and pass to common logarithms, we obtain

$$(16) \qquad \text{Log}\,\frac{p'}{p_0} = 9.78\,\frac{t}{T}.$$

The value of Log p_0 resulting from equation (13) is -2.2198, or $+0.6610$ in case we adopt a millimeter of mercury as the unit of pressure. With this value, the values of p', given in the table below have been computed by the use of equation (16).

In the computation of the vapor tension over water the value of ρ given by equation (12) is to be substituted in equation (5) in order to be consistent with the assumptions of this present article. The result of the integration of the equation thus obtained can be expressed in definite form, but a development in series is preferable. For high temperatures the result will then certainly be incorrect, since the law of Marriott then no longer obtains; but for very low temperatures this is of no importance, since at these temperatures it is no longer possible to keep the water in its fluid condition; therefore we give the development that form which seems most appropriate for temperatures in the neighborhood of 0° C., viz:

$$(17) \quad \log \frac{p}{p_0} = \frac{\rho_0}{R\,T_0} \cdot \frac{t}{T}\left(1 - \frac{t}{6\,(\tau - T_0)} + \frac{3\tau - 5\,T_0}{18\,T_0\,(\tau - T_0)^2}\,t^2 - \ldots\right)$$

or after the substitution of the numerical values:

$$(18) \qquad \text{Log}\,\frac{p}{p_0} = \frac{t}{T}\left(8.628 - 0.00394\,t + 0.000002\,t^2 - \ldots\right).$$

The values of p given below have been computed by this formula.

As above stated the empirical formula (13) represents the observations of vapor tension at the higher temperatures very well. But it would appear *a priori* improper to apply it to very low temperatures, since this formula does not harmonize well with the assumption of the applicability of the Marriott law. It is therefore necessary to investigate to what extent the continuity is practically preserved in the computation of p by the two formulæ (13) and (18). We therefore rewrite equation (13) in the same form as equation (18) and it becomes:

$$(19) \qquad \text{Log}\,\frac{p}{p_0} = \frac{t}{T}\left(8.617 - 0.00406\,t + 0.000007\,t^2 \ldots\right).$$

The difference between the values of p computed by formulæ (19) and (18) attains a maximum of about 0.0016^{mm} of mercury in the neighborhood of $t = -13.6°$ C. Therefore, in consideration of the accuracy of our present knowledge of the observed vapor tensions, we may consider formulæ (18) and (19) as identical for temperatures below 0° C.

Of all the assumptions that underlie the computation of the values of p and p' in the following table, that of the vapor tension at 0° C. is the most uncertain. However, even a perfectly accurate new determination for the lower temperatures would scarcely give anything more than an improvement on this value, but it would of course be more desirable to determine it directly. The values of p' for very low temperatures are of interest in questions of cosmic physics.

Pressures of saturated aqueous vapor expressed in millimeters of mercury.

t.	Over ice. p'.	Over water. p.
°*C.*	*Mm.*	*Mm.*
0	4.581	4.581
− 5	3.010	3.162
−10	1.946	2.145
−11.7	1.672	1.873
−15	1.237	1.432
−20	0.772	0.939
−25	0.473	0.604
−30	0.284	....
−35	0.167	....
−40	0.096	....
−45	0.054	....
−50	0.029	....
−55	0.016	....
−60	0.008	....
−65	0.004	....
−70	0.002	....
−75	0.0009	....
−80	0.0004	....

AURORAL OBSERVATIONS ON THE SECOND WELLMANN EXPEDITION MADE IN THE NEIGHBORHOOD OF FRANZ JOSEF LAND.

By EVELYN B. BALDWIN, Observer, Weather Bureau.

A very complete record of auroral phenomena was kept by

[4] W. Fischer, Wiedemann's Annalen, 1886, Vol. XXVIII, p. 400.

Mr. E. B. Baldwin as the meteorologist of the second Wellmann Expedition, in connection with his detailed meteorological record. The latter was published as Part VII of the Annual Report of the Chief of the Weather Bureau for 1899–1900. It is understood that the hours and minutes in this record refer to local mean time.

The record itself is as follows:

AT FORT MCKINLEY.

October 7, 1898, 7:45 *p. m.*—Aurora visible in the east first as a faint band of light, brightening into a waving curtain or curtains, extending from a point in the southwest to far into the northeast. From 10 p. m. of the 7th to 2:30 a. m. of the 8th display very bright and beautiful. At 10 p. m. beams of light shot upward, converging in the vicinity of Cassiopeia. Pressure, 30.13 to 30.14; temperature, 12° to 9° F.; wind, northeast at 8 miles per hour.

October 21, 1898, 7 *p. m.*—Aurora, curtain form, in the zenith. Pressure, 29.70; temperature, —1° F; wind, northwest at 12 miles per hour.

ON A SLEDGE JOURNEY.

October 22, 1898, 6 *p. m.*—Aurora, curtain form, in the zenith. Pressure, 29.96; temperature, —11°; wind, north at 10 miles per hour.

October 25, 1898, 5 *p. m.*—Aurora, curtain form and fine, east to west across the zenith. Pressure, 29.89; temperature, 12° F; wind, calm.

October 27, 1898, 4 *p. m.*—Aurora, a faint streak in the zenith, extending from east to west. Pressure, 30.05; temperature, —4° F.; wind, north, light.

AT HARMSWORTH HOUSE, FRANZ JOSEF LAND, 80° N.; 58° E. NOVEMBER 1, 1898, TO MARCH 13, 1899.

November 1, 1898, 12 *noon.*—Light auroral streaks, extending east and west, from Cassiopeia across Ursa Major. Pressure, 30.23; temperatures, —11° F.; wind, north at 34 miles per hour.

November 3, 1898, 6 *p. m.*—Aurora, light parallel rays in two bands extending east and west through Ursa Major over Polaris and terminating in Cepheus. Pressure, 30.40; temperature, —5° F.; wind, north at 14 miles per hour.

9 *p. m.*—Aurora, a faint patch of auroral rays over the head of Taurus, being brightest in the vicinity of Aldebaran. Pressure, 30.38; temperature, —5.5° F.; wind, north at 15 miles per hour.

November 4, 1898, 8 *p. m.*—Aurora, a light or yellowish band upon the rump of Ursa Major and a similar phenomenon just below Aldebaran, or Alpha Tauri. Pressure, 30.30; temperature, —9° F.; wind, north at 15 miles per hour.

10 *p. m.*—Aurora, two light parallel bands from Taurus to Pegasus. Pressure, 30.30; temperature, —9.0° F.; wind, north at 16 miles.

November 5, 1898, 8 *p. m.*—Aurora, two light parallel bands extending from the head of Taurus (brightest in the vicinity of Aldebaran) just below Cassiopeia, and terminating immediately below the head of Draco. Pressure, 30.25; temperature, —10.0° F.; wind, northeast at 8 miles per hour.

10 *p. m.*—Aurora, a fine display of yellowish light bands and curtains extending from Taurus in the east, across the head of Cetus, the lower member of Pisces, Aquarius, and Capricornus. Pressure, 30.25; temperature, —10.0° F.; wind, north at 8 miles per hour.

November 6, 1898, 10 *p. m.*—Aurora, a grand display under all the circumpolar constellations within 35° of Polaris. Form variable, in bands, curtains, patches, and rays; color, yellowish; movement, northwest to south or southeast. Pressure, 30.23; temperature, —6.0° F.; wind, south, light.

November 7, 1898, 4 *p. m.*—Aurora, three nearly parallel bands from east to west, or from Cassiopeia across the neck of Camelopardus and the body of Ursa Major to the body of Leo. Aurora and stars visible through alto-cumulus clouds. Pressure, 29.95; temperature, 6.0° F.; wind, north at 10 miles per hour.

6:20 *p. m.*—Aurora, continuation of the above display as four waving curtains of light yellowish hue, following, in a general way, the zodiacal constellations Aries, Cetus, Pisces, Pegasus, Aquila, Aquarius, and Capricornus. Meteor descended from east to west. Pressure, 30.00; temperature, 0° F.; wind, north at 10 miles per hour.

November 7, 1898, 9:10 *p. m.*—Continuation of the above auroral display, including the constellations Gemini, Taurus, and Ophiuchus. Pressure, 30.05; temperature, —4.0° F.; wind, north at 10 miles per hour.

9:20 *p. m.*—Very beautiful display, extending over all circumpolar constellations. Form, folding curtains, inclining toward Gamma Cephei (knee of Cepheus). Color, light yellow generally, but at times showing the colors of the spectrum and occasionally of uniform reddish-yellow as portions of the curtains changed to cloud-like forms. Motion through every point of the compass, but wave movement generally from east to west and from west to east, the curtains moving en masse from south to north or vice versa. Display remarkably bright at times, casting sufficient light to give the appearance of moonlight upon the snow, and strong enough to cast shadows of the limbs of the observer. Pressure, 30.05; temperature, —5.0° F.; wind, north at 10 miles per hour.

10 *p. m.*—Gradual diminution of the display till its final cessation about 10:30 p. m. Pressure, 30.05; temperature, —6.0° F.; wind, northwest at 10 miles per hour.

November 8, 1898, 3:55 *p. m.*—Aurora, a light yellowish bow extending from Aries, in the east, across the head of Taurus, and across the bodies of Camelopardus, Lynx, and Ursa Major, terminating on the bodies of Leo Minor and Leo Major and ascending from Ursa Major, as a bright yellow curtain (tinted with the colors of the rainbow), the beams or rays of light inclining toward a point midway between Polaris and the head of Draco, that is toward the body of Draco and the knee of Cepheus (see also auroral display 9:20 p. m. of yesterday). Meteor shot across the body of Leo Minor, from north to south. Pressure, 30.22, temperature,—12.0° F.; wind, northeast, light.

8:45 *p. m.*—Continuation of the display through varying phases to its appearance at this period as an irregularly shaped bow, between Aries and Taurus, in the east, below Pegasus, over the body of Aquarius, between Aquila and Capricornus, across Ophiuchus and Serpens, Libra and Virgo. Sky overcast, but the bow plainly indicated in subdued yellow. Wind, light from the north. Pressure, 30.20; temperature, —13.5° F.; wind, north, light.

November 9, 1898, 12:50 *a. m.*—Aurora, a yellow patch or cloudlike form over the body of Pegasus. Pressure, 30.18; temperature, —14.0° F.; wind, north, light.

2 *p. m.*—Aurora, display began at 2 p. m. as a luminous patch nearly in the zenith, and at 3:45 p. m. gradually assumed the form of an irregularly shaped yellowish bow extending from east to west across Cetus, Pisces, head of Pegasus, Equuleus and Aquarius, head of Ophiuchus, Serpens and Hercules, Corona Borealis, Bootes, Canes Venatici, and Coma Berenices, the phenomenon at 4 p. m. being a series of long and short bows covering, in a general way, the circumpolar constellations. Meteor, describing a short path from northeast to southwest across the body of Leo Minor, was observed at 3.45 p. m. Gradual appearance or growth of bows from south to north, but movement from north to south. Pressure, 30.05; temperature, —15.0° F.; wind, northeast, light.

5.55 *p. m.*—Continuation as a great luminous canopy, elliptical in contour, extending in a northeast and southwest direc-

tion. Folding curtain hanging from edges of canopy and rapid movement of curtain in opposite directions, that is, in a general way; east curtain moving eastward and the west curtain moving westward, thus extending the canopy to axes of from 15° (northwest and southwest) to 45° (northeast and southwest) from the zenith. Portion of curtain hanging in the northeast being of a greenish color. Pressure, 30.05; temperature, —16.0° F.; wind, northeast and nearly calm.

8 *p. m.*—Continuation of the display as in the previous paragraph, with the addition of a bow from 5° to 10° northward of the central luminous canopy. In general, the display permanent from Orion and Taurus in the east to Libra and Virgo in the west. The curtains inclining sharply and distinctly toward Cepheus, converging or knotting in that constellation. Rapid movements in the bow and canopy from west to east, alternating irregularly with turbulent motion in the canopy, as in snow driven about by violent gusts of wind. Occasional appearances of shafts, rays or beams of yellowish light, separate from the curtains, but parallel with the planes or faces of the same, and therefore pointing toward Cepheus. Pressure, 30.04; temperature, —17.0° F.; wind, northeast, light.

November 10, 1898, 5:20 *p. m.*—Aurora, a light yellowish semibow extending from the rump of Leo Major, in the west, across Coma Berenices, Canes Venatici and the tail of Ursa Major to Cepheus. Pressure, 30.05; temperature, —18.0° F.; wind, north at 18 miles.

7:45 *p. m.*—Continuation of the display as a field of light or thin canopy covering the constellations immediately surrounding Polaris, with curtains hanging from the edges of the canopy, the brightest curtain on the north edge, extending from Taurus in the east, the feet of Auriga the bodies of Lynx and Leo Minor, Coma Berenices, the tail of Ursa Major and Canes Venatici, and terminating in the west, upon the breast of Bootes. Pressure, 30.06; temperature, —17° F.; wind, northeast at 18 miles per hour.

9:48 *p. m.*—Continuation of the display as a light yellowish patch, covering the head of Orion and the horns of Taurus and springing thence as a tenuous bow across Perseus, Cassiopeia, Cepheus, Draco, and Hercules. Pressure, 30.06; temperature, —17.0° F.; wind, northeast at 18 miles per hour.

November 11, 1898, 5 *p. m.*—Aurora, a yellowish bow extending from Taurus in the east-northeast across Triangulum, Andromeda, Cygnus, Lyra, the heads of Hercules, Ophiuchus and Serpens, and terminating in the west southwest in the region of Virgo. Pressure, 30.19; —19.3° F.; wind, northeast at 19 miles per hour.

7 to 8.30 *p. m.*—Continuation of the display as a double arc or bow extending from Orion in the east, the fore limbs of Taurus, bodies of Aries, Pegasus, Vulpecula, heads of Hercules, Ophiuchus, and Serpens and terminating in the region of Virgo, the northernmost bow is the brighter. A light series of "patches" extending from the fore limbs of Taurus across the head of Cetus, the lower member of Pisces, Aquarius, Capricornus, the lower limbs of Ophiuchus, Libra, and terminating upon the skirt of Virgo. Pressure, 30.20; temperature, —20.0° F.; wind, northeast at 19 miles per hour.

November 12, 1898, 6 *a. m.*—Aurora, a light bow springing from Orion and extending thence irregularly toward Cepheus. Pressure, 30.23; temperature, —19.0° F.; wind, northeast at 19 miles per hour.

9 *a. m.*—Aurora, an arch or bow of yellowish light, extending from Orion in the west, and crossing Canis Minor, Cancer, the head of Hydra, Leo Major, Canes Venatici, the tail of Ursa Major, and resting upon Draco. Pressure, 30.25; temperature, —18.5°; wind from the northeast at 18 miles per hour.

5 *p. m.*—Aurora, a double arch springing from Cetus, the lower and brighter bow passing thence over Pegasus, Aquarius, Capricornus, the lower limbs of Ophiuchus, Libra, Virgo, and terminating upon Coma Berenices in the west; the upper bow covering Pegasus Vulpecula, Hercules, Corona Borealis, Bootes, and meeting the lower bow upon Coma Berenices. Pressure, 30.40; temperature, —18.0° F.; wind, northeast at 17 miles per hour.

6:30 *p. m.*—Continuation of the display as a light "patch" over Orion and the fore limbs of Taurus, with beams ascending thence to Cassiopeia and Cepheus. Pressure, 30.44; temperature, —18.5° F.; wind, northeast at 17 miles per hour.

9 *p. m.*—Continuation of the display as a golden bow, partially obscured by thick weather, extending from Orion in the east and thence following the constellations of the celestial equator to Bootes in the west, also two bands or series of parallel beams, the one extending from Coma Berenices, across the breast of Bootes and the body of Draco, to the lower limbs of Cepheus, the other from Vulpecula, across the neck and northern wing of Cygnus to the lower limbs of Cepheus (the two bands thus forming an acute angle upon the lower limbs of Cepheus). Pressure, 30.49; temperature, —18.5° F.; wind, northeast at 17 miles per hour.

November 13, 1899, 4 *p. m.*—Aurora, light beams ascending from Coma Berenices across Canes Venatici, the tail of Ursa Major, and body of Draco. Pressure, 30.74; temperature, —20.0° F.; wind, northeast at 8 miles per hour.

5 *p. m.*—Aurora, a golden bow extending from the head of Cetus across lower Pisces, the back of Pegasus, Aquarius, Capricornus, the lower limbs of Ophiuchus, Libra, Virgo, and Leo Major, with beams ascending from the portion of the bow covering Leo Major and Virgo, across Canes Venatici, Coma Berenices, Bootes, tail of Ursa Major, bodies of Draco and Ursa Minor to Cephus. Pressure, 30.74; temperature, —21.0° F.; wind, northeast at 8 miles per hour.

8 *p. m.*—Continuation of the display; beams or shafts of yellowish light ascending from Orion and Taurus and crossing Perseus and the feet of Cassiopeia and meeting upon Cepheus, similar shafts ascending, firstly, from Corona Borealis and Hercules, and crossing the body of Draco, and, secondly, from Aquila, crossing Vulpecula and Lyra. Pressure, 30.70; temperature, —20.5° F.; wind, northeast at 8 miles per hour.

November 16, 1898, 5 *p. m.*—Aurora, a light arch (golden), brightest at the beginning or origin, springing from the head of Cetus, crossing the lower member of Pisces, Aquarius, Capricornus, Ophiuchus, and Libra, and terminating in the vicinity of Libra. Very light arc extending from Corona Borealis across the feet of Hercules, the body of Draco and Cepheus to Cassiopeia. Meteor, originating in Cassiopeia, descended 10° toward southeast. Pressure, 30.00; temperature, 27.5° F.; wind, east, very light.

November 17, 1898, 5 *a. m.*—Aurora, arch. Pressure, 28.55; temperature, 26.5° F.; calm.

9 *p. m.*—Aurora, a golden glow, producing a striking effect upon the edges of a long, black-looking stratus cloud in the south, i. e., the aurora behind the cloud, thus giving the cloud a golden "lining" from the belt of Orion in the east across the head of Cetus, lower member of Pisces, and terminating upon the breast of Aquarius, with beams passing thence upward across the heads of Aquarius and Pegasus to the body of Cepheus. Pressure, 28.61; temperature, 18.0° F.; wind, west, light.

10:30 *p. m.*—Continuation of the display as an irregular bow covering the above-mentioned constellations. Meteor descended southeast from Cassiopeia. Pressure, 28.61; temperature, 14.5 F.; wind, west, light.

11:30 *p. m. to* 12:30 *a. m.*—Same as at 10:30 p. m., with increase in light and number of arcs or broken bows from the tail of Ursa Major to Cassiopeia. Noticeable moonshine

effect directly traceable to the display, varying with intensity of display and clearly casting a shadow of the observer. Pressure, 28.61; temperature, 14.0° F.; wind, west, light.

November 18, 1898, 12:35 *p. m.*—Aurora, a shaft of light ascending from Canis Minor in the west-northwest. Pressure, 28.65; temperature, —5.0° F.; wind, northwest at 16 miles per hour.

1 *p. m.*—Continuation of display, arcs and beams ascending from Aquarius in the east across the head and neck of Pegasus, Equuleus, Delphinus, Vulpecula, and neck of Cygnus to Cepheus. Pressure, 28.65; temperature, —5.0° F.; wind, northwest at 16 miles per hour; dip circle, 82.0; azimuth, oscillating, eastern declination, increased.

3:45 *p. m.*—Continuation of display; bright golden glow around dark stratus clouds above eastern, southern, and western horizon, the glow being very bright upon belly and fore limbs of Pegasus, lower member of Pisces, breast of Aquarius and back of Capricornus, and reflected upon alto-cumulus clouds, extending from edge of stratus clouds to zenith. Alto-cumulus clouds moving from northwest and stratus clouds from southwest. Wind from northwest and gusty, blowing fine, wet snow. Pressure, 28.65; temperature, 6.0° F.; wind, northwest at 16 miles per hour.

5 *p. m.*—Dip circle, normal, 82° 30′; reading, 82° 30′; azimuth circle, normal, 151° 40′, with slight oscillation of needle; aurora, bright oval-shaped field of light springing from Orion and head of Cetus, in the east, across Taurus, Aries, Perseus, Andromeda, Camelopardus, Cassiopeia, Cepheus, Ursa Minor (including Polaris), Draco, tail of Ursa Major, and Bootes. Pressure, 28.65; temperature, 6.0° F.; wind, northwest at 18.5 miles per hour.

8 *p. m.*—Dip circle, normal, 82° 00′; reading, 82° 30′; azimuth circle, normal, 151° 40′; first reading, 153° 25′; second reading, 152° 05′; declination increased at first reading (circle increasing from left to right); no oscillation observable.

Aurora, bright display in west, with light glow in east, drifting snow, and dark stratus clouds preventing exact location of display, referred to constellations or stars. Pressure, 28.68; temperature, 8.0° F.; wind, northwest at 20 miles per hour.

November 19, 1898, 5 *p. m.*—Aurora, light yellow bow extending from Taurus and Cetus, in the east, across Perseus, Cassiopeia, Cepheus, Ursa Minor, tails of Draco and Ursa Major to Bootes, in the west, with yellowish streamers and diffused light arising from Leo Major, in the north, crossing Leo Minor, head and shoulders of Ursa Major, and apparently inclined toward Polaris and Cepheus. Pressure, 29.19; temperature, 3.0° F.; wind, northwest at 12 miles per hour.

5:40 *p. m.*—Continuation of display with yellow band extending along eastern horizon from Orion to shoulder of Taurus and head of Cetus, rising thence as diverging bows or semicircles of gold, inclining from Polaris 45° southward and converging upon Bootes. Pressure, 29.16; temperature, 2.5° F.; wind, northwest at 10 miles per hour.

7 *p. m.*—Aurora, continuation of display as series of incomplete and complete bows rising from Orion and Taurus, in the east, and covering space thence northward to Polaris and descending to Bootes; also continuous bow springing from head of Cetus, crossing Pegasus, Aquila, heads of Ophiuchus and Hercules, and uniting with the other bow upon Bootes. Bows crossed transversely by lower stratus clouds, thus concealing sections of bows. Movements of eastern arcs from south to north, with streamers or rays converging thence toward Polaris and Cepheus. Arcs of bows at highest altitude, shading from violet or lilac on northern edges to green. Pressure, 29.18; temperature, 2.0° F.; wind, southeast, nearly calm.

Dip circle: 82° 30′ (normal). Azimuth circle: 152° 20′ and no oscillations of needle observable.

7:40 *p. m.*—Display continues as about described in preceding paragraph, with increased movement of eastern arcs toward the north (geographical). Meteor descends midway between Ras Alhague and Ras Algethic, disappearing upon the left shoulder of Ophiuchus. Pressure, 29.19; temperature, 0.0°; wind, calm.

8:30 *p. m.*—Continuation, with increase of light in west, movement of arcs in that region from north to south. Streamers from all parts of display converging toward and upon Cepheus. Black spots upon eastern arcs having appearance of clouds, but in reality being blue sky appearing black by contrast; stars scintillating brightly in these black spaces, and light, or edges of arcs surrounding them, expanding till the identity of clear sky is revealed. Traces of green and red observable. Movement of eastern arcs from south to north as a whole, with shuttle-like motion from east to west, or vice versa in individual arcs, with occasional rapid springing of portions of the arcs in opposite directions from given points in the same arc at the same moment. Pressure, 29.20; temperature, —1.0° F.; wind, southeast, very light.

11:45 *p. m.*—Continuation of the display from Orion, across Cetus, Aquarius, and Capricornus to the breast of Ophiuchus. Dark stratus clouds breaking the bow. Pressure, 29.20; temperature, —2.0° F.; wind, southeast, very light.

November 21, 1898, 4 *p. m.*—Aurora, yellow cloud-like forms in the south.

4:45 *p. m.*—Continuation of the display as a waving curtain from Gemini in the north, across Lynx and Camelopardus, meeting an arc or curtain ascending from Taurus across Perseus, feet of Cassiopeia and Cephus, Polaris, and tail of Ursa Major. Pressure, 29.62; temperature, —1.0° F.; wind, north at 7.5 miles per hour.

5 *p. m.*—Dip circle: Oscillating between 82° 30′ (normal) and 83° 00′ for twenty minutes. Azimuth circle: oscillating for twenty minutes. First reading, 158° 28′; second reading, 156° 05′ (normal 151° 50′). Continuation of auroral display; bright yellow arc or three-quarters of a circle resting upon Auriga, Camelopardus, and Lynx, brightest portion upon Camelopardus, with opening in opposite direction, toward Gemini, and great spiral tongue shading into tints of green, red, and blue, curving from Auriga around upon Perseus, Cassiopeia, Cepheus, Draco, Ursa Minor, Ursa Major, and Bootes, followed by wide expansion of arc and tongue into great arc or bow extending from east to west through zenith with alto-stratus clouds crossing and veiling sections of same in west; bow accompanied by short arcs, rays, and masses of yellow on both sides, while beams of silvery yellow shot upward converging upon Cepheus and Cassiopeia, the display then gathering great intensity with a storm of yellow surging upon Cepheus, during which time oscillations of dip and azimuth needles were greatest. Pressure, 29.62; temperature, —1.0° F.; wind, north at 7.5 miles per hour.

9 *p. m.*—Display continues as an acute angle of light yellow streaks extending from Orion in the east-southeast across the head of Cetus, Pegasus, and Aquarius, meeting similar streak upon Aquila, this streak or band extending thence across Cygnus and Cepheus to Cassiopeia. Pressure, 29.63; temperature, —1.0°; wind, north at 7.5 miles per hour.

9:30 *p. m.*—Corona Borealis in northwest flaming in yellow tinged with green, violet, and blue. Pressure, 29.63; temperature, —1.0° F.; wind, north at 7.5 miles per hour.

November 22, 1898, 3:30 *a. m.*—Aurora, yellow plane 10° in width, streaked with stratus clouds extending across Canis Minor, head of Monoceros, Orion, head of Cetus, lower member of Pisces, back of Pegasus, head of Aquarius, and Aquila, with bow of silvery yellow beams springing from region of Monoceros, crossing Canis Minor, Gemini, Cancer, Lynx, head of Ursa Major, tail of Draco, body of Ursa Minor, and rest-

ing upon the head of Draco. Pressure, 29.63; temperature, —6.0° F.; wind, northeast at 12 miles per hour.

2 *p. m.*—Aurora, a waving curtain of yellow tinted with green and lilac, extending from Aquila, Vulpecula, Cygnus, head of Draco and Bootes. Pressure, 29.60; temperature, —13.5° F.; wind, northeast at 20 miles per hour.

November 23, 1898, 5 *p. m.*—Aurora, a double arc of silver from the head of Cetus in the east, across Pegasus, Cygnus, Vulpecula, Lynx, Hercules, Corona Borealis, and Bootes, with silvery cloud-like forms scattered generally over the heavens. Moon shining brightly. Pressure, 29.63; temperature, —11.0° F.; wind, northeast 29.7 miles per hour.

November 24, 1898, 11 *p. m*—Aurora, a light shaft (of beams) ascending 10° from the feet of Gemini. Weather fine; bright moonshine through the clouds. Pressure, 29.70; temperature, 2.0° F.; wind, northwest at 11.5 miles per hour.

November 27, 1898, 3:30 *to* 4:30 *p. m.*—Aurora, light beams playing upward from Bootes (in the west), Leo Major, Leo Minor, Cancer, Gemini, and Auriga. Pressure, 29.85; temperature, —8.0 to 9.5 F.; wind, northeast, light.

3:30 *to* 9:30 *p. m.*—Aurora, a beautiful display in the form of beams and brilliantly colored curtains darting and moving from Leo Major in the northeast, across Canis Minor, Orion, head of Cetus, lower member of Pisces, Aquarius, Capricornus, and Aquila. At 9:30 p. m. the dip circle oscillating between 85° (normal) and 84° 30′. Bright moonshine. Pressure 29.84; temperature, —12.0° to —15.0° F.; wind, northeast, light.

November 28, 1898, 9 *p. m.*—Aurora, a very brilliant display of curtain form, first from Orion in the east-southeast, across the head of Cetus, lower member of Pisces, Aquarius, Capricornus, rising higher and playing rapidly among the stars of Aquila, Cygnus, Pegasus, and Cepheus, forming at length a whirlpool of green, purple, and lilac with beams and curtain planes converging upon Cepheus, at which moment the azimuth circle moved quickly from its normal position at 14° 40′ (reset), to 17° 40′. The general movement of the entire display was from east to west, at 9:30 p. m., a curtain of color extending from Bootes in the north across Ursa Major, Lynx, and Leo Major. Pressure, 29.90; temperature, —17.0° F.; wind, northeast, light.

November 29, 1898, 4 *p. m.*—Aurora, faint yellowish beams displaying from Cancer, Virgo, and Bootes, becoming a bright combination of green and lilac in the vicinity of Virgo. Pressure, 29.87; temperature, —18.0 F.; wind, northeast at 10 miles per hour.

December 2, 1898, 10 *p. m.*—Aurora, a light arc hanging from Cassiopeia. Pressure, 29.87; temperature, —16.0° F.; wind, northeast at 6 miles per hour.

December 4, 1898, 5 *p. m.*—Aurora, a bright golden double arc from Taurus and Cetus in the east-southeast across Pegasus and the lower member of Pisces, Equuleus, Vulpecula, the heads of Ophiuchus and Serpens, Hercules, and Corona Borealis to Bootes. Pressure, 30.10; temperature, —10.0° F.; wind, northeast at 32 miles per hour.

10 *p. m.*—Continuation of above display. Pressure, 30.12; temperature, —11.0° F.; wind, northeast at 30 miles per hour.

December 7, 1898, 11 *a. m.*—Aurora, a bright double bow of gold, varying in form to that of curtains extending from Taurus and Cetus, in the northeast, across Andromeda, Cassiopeia, Cepheus, Ursa Minor, and rump of Ursa Major, to Leo Major, on the one hand, and from same initial point across Andromeda and belly of Pegasus, Cygnus, and Draco to Bootes. Display continued during p. m., streaks of stratus clouds crossing same at lower elevation. Pressure, 30.45; temperature, —9.0° F.; wind, north at 26 miles per hour.

5 *p. m.*—Aurora, continuation of the display as an arc of yellowish light extending from Bootes across Corona Borealis, Hercules, and Draco to Cepheus. Pressure, 30.44; temperature, —11.2° F.; wind, north at 14 miles per hour.

9:30 *p. m.*—Aurora, golden figures, in shape resembling the comma and interrogation mark, extending from Bootes, in the north, across the tail and rump of Ursa Major, the tail of Draco, Ursa Minor, and the lower limbs of Cepheus, to Cassiopeia. Pressure, 30.29; temperature, —3.0° F.; wind, northeast at 6 miles per hour.

December 8, 1898, 11 *a. m.*—Aurora, golden glows crossed by narrow bands of stratus clouds from the head of Cetus, in the northeast, across Aries, shoulders and neck of Taurus (Pleiades visible through the same) and terminating upon the lower limbs of Auriga. Pressure, 30.27; temperature, —4.8° F.; wind, southwest at 9 miles per hour.

5 *p. m.*—Aurora, a very light arc extending from Leo Major, in the east, across Auriga, Ursa Major, Coma Berenices, and Canes Venatici to Bootes. Pressure, 30.26; temperature, —13.5° F.; wind, west-northwest at 6 miles per hour.

9:30 *p. m.*—Aurora, continuation of the forenoon display as a bright golden semicircle extending from Sextans and the fore paws of Leo Major across the head of Hydra, Monoceros, Canis Minor, the belt of Orion, Cetus, Aquarius, and Capricornus. Pressure, 30.25; temperature, —21.0° F.; wind, north at 10 miles per hour.

10 *to* 10:30 *p. m.*—Grandest display of the season, nearly the entire northern heavens being resplendent in green and red purple beautifully intermingled with waving curtains of gold, graceful arcs of silver, and darting, dancing, leaping, falling shafts of fire the entire phenomenon forming at 10 p. m. a vast corona seemingly supported upon pillars of fire converging upon the region between Cassiopeia and the lower limbs of Cepheus, at which moment there was rapid oscillation of the azimuth needle and pendulum-like motion of the dip circle needle between 85° 00′ (normal) and 84° 30′. Pressure 30.25 to 30.26; temperature, —22.0° F.; wind, north at 10 miles per hour.

December 9, 1898, 3 *p. m.*—Aurora, a light band extending from Taurus (covering the Pleiades) in the east, across Andromeda, Cassiopeia, Cepheus, Draco, Ursa Minor, tail and rump of Ursa Major, Canes Venatici, and terminating upon Bootes. Pressure, 30.28; temperature, —28.0° F.; wind, northeast at 8 miles an hour.

4 *p. m.*—Continuation of the display as a bright silver-yellow double arc covering the preceding constellations with maximum brightness over Cepheus and Draco. Arcs swinging gradually from north to south and vice versa. Pressure, 30.29; temperature, —28.0° F.; wind, northeast at 8 miles per hour.

5 *p. m.*—Afternoon auroral display alternately appearing and vanishing, gradually reappearing at 5 p. m. as two golden fields, the one in the east covering the head of Cetus, slowly rising thence across the Bee, Triangulum, Aries, the upper member of Pisces, Andromeda, and Cassiopeia, and meeting upon Cepheus; the other emerging from the head of Serpens, in the west, and crossing thence Hercules and Draco. Pressure, 30.28; temperature, —28.0° F.; wind, northeast at 5.8 miles per hour.

10 *p. m.*—Continuation of the auroral display as a flaming cone of yellow with the apex upon Cepheus and the base extending from Leo Major, in the east, across the feet of Gemini, heads of Orion, Taurus, and Cetus to Aquarius; then gradually crumbling into a field of delicate blue-green and again changing to a waving curtain, now folding itself rapidly to the east and then as rapidly to the west. Pressure, 30.30; temperature, —24.0° F.; wind, northeast at 9 miles per hour.

December 10, 1898, 3 *to* 5 *p. m.*—Aurora, continuation of the display, appearing as a faint light in the northwest at 3 p. m., but at 5 p. m. existing as a pale green arc curtain-shaped for 10° above the horizon at the east and west points, with a spray or mist-like roll intervening, the entire bow springing from

the shoulders of Orion (in the east), curving sharply upon the head of Taurus (place of greatest intensity with curtain of red-green color) and thence over Perseus, Cassiopeia, Cepheus, Ursa Minor, the main part of the body of Draco and Hercules to the head of Serpens. Pressure, 30.42; temperature, —23.0° F.; wind, northeast at 11.5 miles per hour.

10 *p. m.*—Aurora, a dull green arc extending from Leo Major and Sextans, in the northeast, across the head of Hydra, the lower claw of Cancer, Canis Minor, feet of Gemini, head of Taurus, lower member of Pisces, and resting upon the back of Pegasus. Pressure, 30.45; temperature, —24.0°; wind, northeast at 8.4 miles per hour.

December 11, 1898, 3 *to* 7:30 *p. m.*—Aurora began at 3:00 p. m. as a light green arc extending from Leo Major in the northeast across the constellation thence to Ursa Major and gradually expanding into a collection of small arcs and luminous spaces covering Cepheus, Cassiopeia, and Cygnus. At 5 p. m. the display was marked by reddish-green shafts inclining from the constellations in the east and west, toward Cepheus. At 7:30 p. m. a silvery green bow, folded in places into a curtain form, marked its course from the paws of Leo Major upon the head of Hydra, lower claw of Cancer, feet of Gemini, head of Orion, Taurus, Aries, Pisces, and Pegasus. Pressure, 30.66 to 30.70; temperature, —28.0° F. to —29.0° F.; wind, south, very light.

10 *p. m.*—Aurora, covering the constellations as at 7:30 p. m., of the curtain variety and of beautiful red-green color. Parts of the curtain waving in opposite directions (to the east and to the west) from given points. Occasionally meteors of short paths ascending toward Aries from the head of Taurus. Pressure, 30.70; temperature, —27.0° F.; wind, southwest, very light.

December 12, 1898, 5 *p. m.*—Aurora, a dim yellow band in the north and northwest, much obscured by drifting snow, covering Leo Major, Cancer, the feet of Gemini, the lower limbs of Taurus, and the head of Cetus. Pressure, 30.75; temperature, 4.8° F.; wind, northwest at 20 miles per hour.

December 14, 1898, 5 *p. m.*—A dull yellow arc (much obscured by clouds) extending from Taurus, in the east, crossing Aries, the lower member of Pisces, Aquarius, and Capricornus. Pressure, 30.50; temperature, —6.0° F.; wind, northeast at 10 miles per hour.

December 15, 1898, 3 *to* 5 *p. m.*—Aurora, a dull yellow arc (began at 3 p. m.) from Taurus, in the east, extending over Aries and the lower member of Pisces to Aquarius. Pressure, 30.55; temperature, —8.0° F.; wind, north at 18 miles per hour.

10 *to* 11.30 *p. m.*—Continuation of the display; one brightly colored arc in the east, seeming to extend from north to south, with a curvature or bend toward the west, covering the paws of Leo Major, Cancer, the feet of Gemini, Canis Minor, and the right shoulder of Orion; in reality, only one of a series of arcs and bows covering the constellations and parts of constellations of the celestial equator and ecliptic, viz, Taurus, Aries, Cetus, the lower member of Pisces, Aquarius, and Capricornus; all of the arcs brightly tinted in green and blue and red, with silvery rays stringing the stars upward half way to the zenith and of unusually low elevation above the sea level, the entire phenomenon displaying singular absence of motion (was this owing to great humidity of the air?). Pressure, 30.57 to 30.58; temperature, —6.5° F.; wind, north at 18 miles per hour.

December 16, 1898, 11 *a. m.*—Aurora, very light beams and rays in the north playing upon Gemini, Auriga, and the head of Taurus. Pressure, 30.60; temperature, —10.2° F.; wind, north at 24 miles per hour.

12 *noon.*—Bright patch covering the rump of Ursa Major, with beams playing thence and from Coma Berenices across Draco and Ursa Minor, and an arc crossing Cancer and the feet of Gemini, in the northeast. Pressure, 30.60; temperature, —11.0° F.; wind, north at 24 miles per hour.

5 *p. m.*—Aurora, continuation of the day's display as a bright silvery arc covering Canis Minor, the head of Monoceros, the upper portion of Orion, Taurus, Cetus, Aries, the lower member of Pisces, the back of Pegasus and Aquarius, with thin sheets of rays scattered here and there to a second arc extending from Auriga across Lynx, the belly and legs of Ursa Major, Leo Minor, Canes Venatici and Coma Berenices to Bootes, the arcs changing to curtain forms tinted in green and red and waving from west to east, with the rays converging or inclining toward the zenith. Pressure, 30.62; temperature, —10.0° F.; wind, northeast at 17 miles per hour.

December 17, 1898, 3 *to* 9:30 *p. m.*—Aurora, a bright silver-yellow double curtain accompanied by ascending beams extending from the fore limbs of Taurus across the head of Cetus, Aries, Pegasus, and Aquila to the heads of Ophiuchus and Hercules. Display began at 3 p. m. as a series of beams ascending from Coma Berenices, in the northwest, passing thence through varying phases to the form observed at 5 p. m., at which time waving folds rapidly moved from east to west and vice versa (alternating), deeply tinged with red-green color, brightest in the region of the head of Cetus. 9:30 p. m., a whirlpool of light (beams, swaying curtains, broken arches, globular patches) covering the head of Leo Major, Leo Minor, Ursa Major, Draco, Ursa Minor, the lower limbs of Cepheus, Cassiopeia, Camelopardus, Lynx, Cancer, Gemini, Canis Minor, the head of Monoceros, the head and breast of Orion, Auriga, Taurus, the head of Cetus, Aries, Perseus, Andromeda, and Pegasus, the brightest portion tinged with green and red, undulating rapidly from southwest to northeast, from Pegasus across Cassiopeia to Leo Major, and swirling about with great rapidity in the region of Cepheus, a restless canopy of color in mid-air throwing its light upon the earth as from the full moon on a clear night. Pressure, 30.45; temperature, —16.0° F.; wind, northeast at 13 miles per hour.

December 18, 1898, 2:30 *to* 5 *p. m.*—Aurora, began at 2:30 p. m. as light beams ascending from Leo Major, Cancer, and Gemini. Pressure, 30.35; temperature, —22.0° F.; wind, northeast at 21.5 miles per hour.

December 19, 1898, 2 *p. m.*—Aurora, a bright golden sheet beautifully tinted in green and red arching from the head of Cetus in the east, crossing Auriga, Camelopardus, and Lynx, to Leo Major and Leo Minor in the west. Pressure, 30.25; temperature, —14.5° F.; wind, northeast at 25 miles per hour.

8 *to* 9 *p. m.*—Continuation of the aurora; two writhing serpents of light, extending from the east to the west, and covering the stars and constellations as follows: The first, and brightest, with its head upon Regulus, crossing thence Cancer and the head of Gemini (Castor and Pollux) Lynx, the head of Ursa Major, the tail of Draco to the body of Hercules; the second, much more tenuous in appearance, springing from the shoulders of Orion, and crossing the feet of Auriga, Perseus, Camelopardus, Ursa Minor, and Draco, and finally blending with the termination of the first upon the body of Hercules. 9 p. m., a continuous arc, brightly colored in green and red in places, extending from the Leos in the north-northeast, across the lower claw of Cancer, the head of Hydra, Canis Minor, and the body of Monoceros, to the breast of Cetus. Pressure, 30.14; temperature, —17.0° F.; wind, northeast at 9 miles per hour.

December 20, 1898, 2 *a. m.*—Aurora, yellowish streaks crossed by stratus clouds in Orion and vicinity. Pressure, 29.99; temperature, —15.0° F.; wind, northeast at 9 miles per hour.

2 *to* 9:30 *p. m.*—Aurora, began at 2 p. m. as slightly colored arcs of reddish yellow, covering Taurus in the northeast and Virgo and Coma Berenices in the west; at 5 p. m. a series of

alternating yellow arcs and silvery veils tinged with red and green, extending from Taurus in the east, across Auriga, Camelopardus, the knees of Cepheus, Ursa Minor, Draco, and Hercules to Ophiuchus in the west. 9:30 p. m., bright golden arc extending from Canes Venatici, across the head of Draco, and between Hercules and Lyra to Aquila. Pressure, 30.72 to 30.70; temperature, —21.0° F.; wind, northwest at 9.5 miles per hour.

December 21, 1898, 5 *p. m.*—Aurora, a silvery band crossing Auriga, Lynx, and Leo Minor, all in the north. Pressure, 30.64; temperature, —25° F.; wind, northwest, very light.

7:15 *to* 10 *p. m.*—A golden band and arch streaked and spotted with stratus clouds to a distance of one-fourth of its length, beginning at Leo Major in the northeast, passing thence across the lower claw of Cancer, the feet of Gemini, Canis Minor, the head and shoulders of Orion, the head of Taurus, and ascending thence across Auriga, Camelopardus, Cassiopeia, and Cepheus, descending upon Cygnus and Vulpecula to Aquila. 10 p. m., silvery yellow arcs swinging above dark stratus clouds, but below alto-stratus clouds in the west. Display carefully observed and relation to the clouds strikingly apparent. Pressure. 30.65; temperature, —27° F.; wind, northwest, very light.

December 22, 1898, 11 *a. m.*—Aurora, light streamers ascending from Aries (tinted here in red and green and playing vigorously), the head of Taurus, Auriga, and Gemini, all above the northern horizon. Pressure, 29.66; temperature, —24.5° F.; wind, west-northwest, very light.

5 *p. m.*—Aurora, a silvery yellow arc above the northern horizon covering the feet of Gemini, Cancer, and the shoulders of Leo Major. Pressure, 30.60; temperature, —22° F.; wind, northwest at 7 miles per hour.

December 28, 1898. 2 *p. m.*—Aurora, bright silvery-golden arcs and streamers tinted here and there with green and red, covering the head of Cetus in the east, Aries, Andromeda, Cassiopeia, Cepheus, Ursa Minor, the main body of Draco, and Bootes in the west, arcs swaying from south to north; the surface wind from the northeast; arcs and streamers appearing to meet upon or incline toward Cepheus. Pressure, 29.35; temperature, —30° F; wind, north, very light.

December 29, 1898, 5 *to* 9 *p. m.*—Aurora, a light golden arch extending from Gemini in the east across Auriga, Cassiopeia, Cepheus, body and head of Draco, to Lyra in the southwest. 7:30 p. m., golden bow reaching from shoulders of Orion in the southeast across Taurus, Aries, Pisces, and Pegasus. Wind from the west, light. Bright meteor visible two seconds, descending (approaching observer like head light of locomotive) from Gamma Geminorum. 9 p. m., visible beneath alto-stratus clouds covering three-tenths of the sky in the southeast. Pressure, 29.77 to 30.08; temperature, —15° to —22° F.; wind, northwest at 8 miles per hour.

December 30, 1898, 5 *p. m.*—Aurora, a light silvery arch from the shoulders of Orion in the southeast across Taurus, Aries, Pisces, belly of Pegasus, and Vulpecula to head of Ophiuchus, and Hercules. 9 p. m., continuation as an irregular golden sheet covering Pegasus (in south-southwest), Vulpecula, Lyra, Hercules, and lower limbs of Bootes in the north. Pressure, 29.57; temperature, —35° F.; wind, northeast, light.

December 31, 1898, 9:30 *p. m.*—Aurora, a light arc crossing the chest of Orion (in the southeast), Cetus and Aquarius (in the west), simultaneous with a display of red-green streamers ascending from Vulpecula, Cygnus, Lyra, Hercules, Corona Borealis, Bootes, Coma Berenices, and the Leos. Pressure, 29.98; temperature, —32° F.; wind, north at 8 miles per hour.

January 1, 1899, 11 *a. m.*—Aurora, light silvery streamers tinged with green ascending from Cetus (in the northeast), Taurus, and Auriga (in the north). Pressure, 30:32; temperature —34.4° F.; wind, southwest at 10.6 miles per hour.

January 3, 1899, 2 *p. m.*—Aurora, streamers ascending from Taurus (in the northeast), the head of Auriga, Camelopardus, Ursa Major, Bootes, and the main body of Draco, and inclining toward Cepheus. Pressure, 29.93; temperature, —20.0° F.; wind, northeast at 12.3 miles per hour.

5 *to* 10 *p. m.*—Aurora, yellowish arcs, crossing Taurus, in the southeast, also rising from Gemini and Cancer, in the east, crossing Lynx, Ursa Major, Draco, Ursa Minor, and Cygnus. 10 p. m., continuation as a yellow band springing from the limbs of Leo Major (in the northeast), crossing Sextans, the head of Hydra, Canis Minor, the belt of Orion (clearly visible in the south, with Rigel sparkling like a diamond), the head of Cetus, and the lower member of Pisces. First time since the stars became visible this season (1898–99) that they have twinkled or sparkled with intensity, doubtless owing, on this occasion, to lack of humidity in the upper air currents. No clouds visible at 10 p. m. Pressure, 30.00 to 30.10; temperature, —7.0° F. to —14.0° F.; wind, north at 14.3 miles per hour.

January 4, 1899, 9:30 *to* 11 *a. m.*—Aurora, streamers ascending from Aries and Taurus (in the north); at 10 a. m. extending across Gemini; at 11 a. m. rising only from the feet of Gemini. Pressure, 30.22 to 30.25; temperature, —14.5° F. to —16.0° F.; wind, northeast at 9.3 miles per hour.

2 *to* 5 *p. m.*—Aurora, bright streamers ascending from Taurus (in the northeast), Gemini, Cancer (in the north), the Leos, Ursa Major, and Bootes (in the west), and inclining toward and upon Cepheus and Ursa Minor. 4 p. m., a bright double curtain of gold with changing tints of rose, lilac, and purple, screened or draped in a veil of silvery gauze, extending from Orion (in the east-northeast) across the head of Taurus, Aries, the upper member of Pisces, the belly of Pegasus, Vulpecula, Cygnus, Lyra, and Hercules. 5 p. m., a golden band extending from Canis Minor (in the northeast) across the head of Orion (in the east), and thence nearly through the zenith to the position of Hercules, in the west, appearing in spaces between clouds—stratus and stratus-cumulus. Pressure, 30.29 to 30.33; temperature, —18.0° F. to —20.0° F.; wind northeast, at 8 miles per hour.

January 5, 1899, 9:30 *to* 11 *a. m.*—Aurora, light streamers ascending from Taurus (in the north) Gemini, and Cancer. 10 a. m., light streamers ascending from Aries. 11 a. m., continuation. Pressure, 30.58 to 30.61; temperature, —20.5° to —23.0° F.; wind, northeast, light to calm.

5 *to* 10 *p. m.*—Aurora, bright arcs and arches extending from Orion and Canis Minor, in the east, across the horns of Taurus, Gemini, Cancer, Leo Major, Auriga, Lynx, Leo Minor, Ursa Major, Ursa Minor, Cepheus, and Draco to Hercules and Corona Borealis, in the west. 10 p. m., continuation. Pressure, 30.63 to 30.60; temperature, —9.5° to —17.0° F.; wind, southwest, light.

January 7, 1899, 5 *p. m.*—Aurora, bright streamers in the west ascending from Corona Borealis and the upper portion of the body of Bootes, crossed by narrow bands of stratus clouds beneath. Pressure, 30.50; temperature, —13.0° F.; wind, northwest at 12 miles.

January 9, 1899, 5 *p. m.*—Aurora, a light golden band from Canis Minor, in the east-northeast, crossing the lower claw of Cancer, the upper portion of Leo Major (in the north), and Coma Berenices, with light streamers ascending from Bootes, Corona Borealis, and Hercules. Pressure, 20.23; temperature, —13.0° F.; wind, northeast at 8 miles per hour.

January 10, 1899, 9:45 *p. m.*—Aurora, a golden arc springing from Cancer (in the east), and crossing Gemini and Taurus (in the south). Pressure, 30.10; temperature, —18.0° F.; wind, northeast at 20 miles per hour.

January 11, 1899, 2 *to* 11 *p. m.*—Aurora, light streamers ascending from Leo Major (in the north-northwest) and Coma Berenices at 2 p. m.; bright golden arcs tinged with red, rising

from the shoulders of Orion (in the east), crossing Auriga, Camelopardus, Ursa Minor, Draco, and Hercules at 4 p. m.; the same much increased in intensity and number of arcs and expanse of celestial dome covered, at 5 p. m. to 10 p. m., continuation. Pressure, 30.07 to 30.09; temperature, —10.0° to —4.0° F.; wind, northeast at 15 miles per hour.

January 14, 1899, 5 *p. m.*—Aurora, a bright arc in the south. Pressure, 30.21; temperature, —19.0° F.; wind, northeast at 27.3 miles per hour.

January 15, 1899, 2 *to* 5 *p. m.*—Aurora, bright golden arcs, arches, and spots, crossing the entire celestial dome from east to west. Visible also at 2 p. m. Lunar halo in the southwest. Pressure, 30.12 to 30.08; temperature, —26.0° F; wind, north at 30 miles per hour.

9 *p. m.*—Aurora, bright golden arc crossing belt of Orion (in the south) and other constellations of celestial equator. (No pressure, temperature, or wind, entered in connection with this aurora).

January 17, 1899, 5 *to* 10 *p. m.*—Aurora, bright golden arches, extending from Orion and Gemini, in the east, across Auriga, Lynx, Ursa Major, and the upper portion of Bootes to Hercules, in the west. At 7 p. m., a great, writhing, serpent of gold, tinted reddish-green in places, extending from Coma Berenices at the head and chest of Virgo, in the north, across the limbs of Leo Major, Cancer, Gemini, Auriga, Perseus, Andromeda, the body of Pegasus, and Vulpecula, to the heads of Hercules and Ophiuchus, in the west, with lighter gauze like arches crossing Taurus, Aries, the head of Cetus, Aquarius, and Capricornus. 8 p. m. Continuation, the display being especially bright in the regions of Leo Major and the belt of Orion. 5 to 10 p. m. Display continuing through varying phases. Pressure, 29.90 to 29.97; temperature, —26.5° to —33.0° F.; wind, north at 16.7 miles per hour.

January 18, 1899, 1 *to* 7:45 *p. m.*—Aurora, began at 1 p. m. as a light arch extending from Ophiuchus and Hercules, in the west, across the head of Serpens, the lower limbs of Bootes, the shoulder of Virgo, Coma Berenices, the limbs of Leo Major and Cancer to the lower limbs of Gemini. 2 p. m., continuation in about the same northern position as a bright golden curtain; bow delicately tinted reddish green. 5 p. m., continuation. 7:45 p. m., a very beautiful double curtain arch (or arches) extending from Sextans and the paws of Leo Major (in the east-northeast) across Cancer, the lower limbs of Gemini, Auriga, Taurus, Aries, and Cetus, with very bright arcs upon the chest of Orion. Entire display lavishly tinted in red, green, and purple. Remarkable motion in the double arch, the upper or more northern bow waving rapidly from west to east, the other curtain undulating as hurriedly from east to west. Wind blowing about 20 miles per hour from the north. Bright moonlight (new half moon in south-southwest). No clouds visible. Arches appear to have unusually low altitudes, referred to the surface of the earth. Pressure, 30.12; temperature, —28.0° F.; wind, northeast at 18 miles per hour.

January 20, 1899, 3 *to* 5 *p. m.*—Aurora, began at 3 p. m. as a double arch or golden bow, becoming a wide band extending from Auriga, in the east, across the fore limbs of Camelopardus, Lynx, the tail of Draco, the head, rump, and tail of Ursa Major and Ursa Minor to Bootes and Hercules. At the beginning of the display the western end of the bow was crossed (subtended) by bands of stratus clouds, the eastern extremity being submerged in a misty appearance of atmosphere. 5 p. m., faint auroral arcs (quite buried in a shower of minute snow crystals) covering the constellations of the celestial ecliptic (stars invisible, but the position of ecliptic known). Pressure, 29.85; temperature, —29.5° to —26.0° F.; wind, south, light.

January 21, 1899, 4 *to* 6:45 *p. m.*—Aurora, began at 4 p. m. as a series of bright red-green tinted golden curtain arcs from Auriga and Gemini, in the east, across Lynx and Ursa Major to Bootes, in the northwest. Invisible at 5 p. m. 6:45 p. m., phenomenon of indescribable beauty, the arctic night displaying a magnificent furnishing of vari-colored cloths of gold and silks of silver, now in tumbling arcs or trembling bows, in hanging curtains or waving tapestry, and then in dancing beams or ascending rods of gold, in swirling pots of color or quiescent seas of silver, all swinging from the sparkling stars, from Polaris to the bright moon-bearing Taurus, in the south, to Corona Borealis and Bootes, in the north, to Leo Major and Cancer, in the east, and to Aquila, in the west, deigning even to cast a resplendent arc to the snow-clad earth itself, resting it upon the basaltic sentinel of Tegetthoff.

About 200 yards northwest of the observatory stands a bold basaltic spire about 400 feet in height. A bright spot of this display appeared to descend below the summit of the spire, dimming its upper outline, the intense portion of the display intervening between the observer and the spire.

Pressure, 30.01 to 30.05; temperature, —31.0° to —33.0° F.; wind, west, light.

January 22, 1899, 3:30 *to* 5 *p. m.*—Aurora, 3:30 p. m., greenish gauze-like arches, extending from Leo Major, in the northeast, across Cancer, Gemini, head of Orion, horns of Taurus, Auriga, Lynx, Camelopardus, Ursa Major, Ursa Minor, Cepheus, Cassiopeia, Cygnus, Lyra, Hercules, Aquila, and Ophiuchus. 5 p. m., in nearly the same position; more intense. Pressure, 30.18 to 30.15; temperature, —34.0° F.; wind, northeast at 7 miles per hour.

January 23, 1899, 9 *a. m.*—Aurora, very light beams ascending across Leo Major, in the west. Pressure, 30.14; temperature, —33.0° F.; wind, southwest at 7 miles per hour.

January 24, 1899, 5 *p. m.*—Aurora, a bright golden curtain above alto-stratus clouds in the northeast, crossing Leo Major and Lynx. Pressure, 30.25; temperature, —12.5; wind, north, light.

January 27, 1899, 5 *p. m.*—Aurora, a curtain arch from Auriga, in the southeast, across the rump of Camelopardus, Cassiopeia, Cepheus, Cygnus, Lyra, Hercules, and Corona Borealis, in the west; brightest in its western termination and tinted reddish-green. Pressure, 30.08; temperature, —27.0° F.; wind, northeast, at 26 miles per hour. Bright lunar halo in the northeast.

January 29, 1898, 5 *to* 8 *p. m.*—Aurora, a golden bow from Canis Minor, in the east-northeast, across the head and shoulders of Orion, Taurus, Aries, Pegasus, and Delphinus, to Aquila; western portion above alto-stratus clouds. 8 p. m., continuation of the display above stratus clouds in the east, southeast, south, southwest, and west. Pressure, 30.24 to 30.20; temperature, —26.0 F.; wind, north at 28 miles per hour.

January 30, 1899, 5 *to* 8:30 *p. m.*—Aurora, light beams ascending from Gemini and Auriga, in the northeast and east, and from Aquila, in the west. 8 p. m., a golden arc crossing Canis Minor, Orion, Taurus, and Cetus. 8:30 p. m., bright double curtain arches extending from Leo Major, in the northeast, and crossing Cancer, Gemini, Auriga, Andromeda, and Pegasus, the more southern bow being bright golden, the other of dark lilac color. Display subtended in places by lower stratus clouds. Pressure, 30.05; temperature, —35.0° F. to —39.0° F.; wind, northeast at 13.5 miles per hour.

January 31, 1898, 5 *to* 10 *p. m.*—Aurora, a golden arc extending above stratus cloud bands, from Canis Minor, in the east, across the head of Orion, Taurus, Aries, Andromeda, Cygnus, and Vulpecula, in the southwest. 10 p. m., continuation somewhat higher in the heavens. Pressure, 30.00; temperature, —43.0° to —45.0° F.; wind, northeast at 19.5 miles per hour.

February 1, 1899, 5 *p. m.*—Aurora, a golden arc crossing

Canis Minor, in the east, the head and shoulders of Orion, Taurus, Aries, Pegasus, and Aquila. Pressure, 29.89; temperature, —38.0° F.; wind, northeast at 20 miles per hour.

February 2, 1899, 5 *p. m.*—Aurora, light beams ascending from Canis Minor, in the east-northeast, crossing Gemini, and continuing thence as a light gold wire band across Lynx, Ursa Major, the tail of Draco, Ursa Minor, the body of Draco, Cepheus, Cygnus, and Lyra to Aquila. Pressure, 29.84; temperature, —41.0° F.; wind, north at 27 miles per hour.

February, 5, 1899, 3 *p. m.*—Aurora, springing from Leo Major, (in the east), and crossing Leo Minor, the forepaws and head of Ursa Major, Lynx, Camelopardus, Cassiopeia, and Cygnus. Pressure, 29.78; temperature, —11.5 F.; wind, east at 26.2 miles per hour.

February 8, 1899, 7 *p. m.*—Aurora, a golden arch springing from Leo Major, in the east-northeast, crossing the forepaws and head of Ursa Major, Lynx, Camelopardus, Cassiopeia, Cepheus, and Lacerta, the lower wing of Cygnus and Vulpecula, and terminating upon Aquila, in the west. Pressure, 29.25; temperature, —22.0° F.; wind, north, light.

February 9, 1899, 5 *p. m.*—Aurora, a light streamer arch from Leo Major, in the east, and crossing the constellations, thence through the zenith westward. Pressure, 29.64; temperature, —32.5 F.; wind, southwest, very light.

February 15, 1899, 4 *to* 7 *p. m.*—Aurora, plainly visible in the east and south at 4 p. m., but veiled by fog. Stars invisible. 7 p. m., bright golden arcs and arches extending from Leo Major, in the east, across Cancer, Gemini, Auriga, Taurus, Aries, Pegasus, etc., westward to Aquila. Display invisible by reason of fog or heavy mist at times. Pressure, 30.20 to 30.22; temperature, —6.0° to —10.0° F.; wind, north at 9.5 miles per hour.

February 16, 1899, 8 *p. m.*—Aurora, very active display of yellow arcs and patches covering the heavens from the eastern to the western horizon for a space of about 90° in width and visible through a murky sky and light fall of snow. Occasionally stars visible. Pressure, 30.18; temperature, —6.0° F.; wind, north, light.

February 23, 1899, 9 *p. m.*—Aurora, golden arcs extending from the feet of Bootes in the east-northeast across Leo Major, Cancer, the feet of Gemini, and the belt of Orion to Cetus in the southwest. Wave like motion from west to east. Pressure, 30 17; temperature, —30.7° F.; wind, northeast, light.

March 2, 1899, 8 *p. m.*—Aurora, a faint silvery arc springing from Leo Major (in the east-southeast), and crossing Leo Minor, Lynx, and Camelopardus, to the feet of Cassiopeia. Pressure, 30.35; temperature, —35° F.; wind, north at 10 miles per hour.

March 3, 1899, 8 *p. m.*—Aurora, an intense display of coronal type, covering the heavens from the belt of Orion in the south-southwest to the lower limbs of Hercules in the north, and from Virgo in the east to Pegasus and Pisces in the west. Rapid movement of streamers and curtains from west to east and from south to north. Delicate tinting of the display in all its parts, but particularly striking along the edges of the enveloping or outer curtains. Central or zenithal portion less tenuous than the parts nearer the horizon. Pressure, 30.30; temperature, —41° F.; wind, north, light.

March 10, 1899, 11 *p. m.*—Aurora, the heavens from the feet of Bootes in the east to the head of Cetus in the west; from the paws of Leo Major in the south to Pegasus in the north, curtained, festooned, tapestried, arched, and pillared in gold and silver, in purple and lilac, and red-green, all waving, trembling, tumbling, and leaping in every imaginable direction. And yet, why, at the same time, that motionless shaft upon the head of Taurus or that quiescent arc amidst a vortex of motion? Pressure, 29.75; temperature, —32.0° F.; wind, west, very light.

March 11, 1899, 9:45 *p. m.*—Aurora, yellowish bands, extending from east to west across the space between the back of Leo Major, in the south, and Polaris. The sky much clouded and a minute description of the display impossible. Pressure, 29.95; temperature, —24.0° F.; wind, north, light.

March 13, 1899, 11 *p. m. to* 12 *midnight.*—Aurora, pink-tinted arcs and dancing shafts upon Gemini and Auriga, in the southwest. 12 midnight, golden haze upon Leo Minor. Pressure, 30.28; temperature, —33.0° to 33.0° F.; wind, north, light.

MEXICAN CLIMATOLOGICAL DATA.

Through the kind cooperation of Señor Manuel E. Pastrana, Director of the Central Meteorologic-Magnetic Observatory, the monthly summaries of Mexican data are now communicated in manuscript, in advance of their publication in the Boletin Mensual. An abstract, translated into English measures, is here given, in continuation of the similar tables published in the MONTHLY WEATHER REVIEW since 1896. The barometric means have not been reduced to standard gravity, but this correction will be given at some future date when the pressures are published in our Chart IV.

Mexican data for March, 1901.

Stations.	Altitude.	Mean barometer.	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Durango (Seminario).	6,243	24.02	88.2	35.6	59.4	38	......	sw.	w.
Leon (Guanajuato)...	5,934	24.30	85.5	34.0	63.0	37	......	nw.	sw.
Linares (Nuevo Leon).	1,188	28.64	101.3	42.8	70 5	51	T.	s.	s , w.
Mazatlan	25	29.95	80.8	63.9	72.1	76	....	nw.	sw.
Merida	50	29.98	92.8	57.0	75.6	68	0.08	ne.	....
Mexico (Obs. Cent.)..	7,472	23.06	84.2	35.6	60.6	37	0.01	sw.	....
Morelia (Seminario)..	6,401	23.96	83.0	41.4	59.9	47	0.03	s.	w.
Puebla (Col. Cat.) ...	7,112	23.39	82.4	38 3	62.6	42	T.	e.	ssw.
Saltillo (Col. S. Juan).	5,399	24.75	86.0	32.0	61.7	69	......	s.	s.
San Luis Potosi......	6,201	24.10	86.2	39.6	62.8	54	......	sw.	w.
Zapotlan (Seminario)	5,078	25.10	90.7	39.2	64.4	39	0.03	sse.	w.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined list of titles has been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau:

Comptes Rendus. Paris. Tome 132.

Angot, A. Sur la variation diurne de la déclinaison magnétique. P. 317.

Symons's Meteorological Magazine. London. Vol. 36.

Curtis, R. H. Pressure of the Wind. P. 2.

Gaea. Leipzig. 37 *Jahrg.*

Elster, J. und Geitel, H. Beiträge zur Kenntnis der atmosphärischen Elektricität. P. 142.

Wollny, E. Ueber den Einfluss der Pflanzendecken auf die Wasserführung der Flusse. P. 162.

Memorias y Revista, Sociedad Cientifica "Antonio Alzate." Mexico. Tomo 15.

Morena y Anda. Correcciones que deben aplicarse á la media diurna de la temperatura deducida de pocas observaciones. Pp. 5–11.

Geographische Zeitschrift. Leipzig. 7 *Jahrg.*

Hann, J. Wissenschaftliche Luftfahrten. Pp. 121–140.

Nature. London. Vol. 63.

Judd, J. W. Recent "Blood Rains." Pp. 514–515.

Bryan, G. H. History and Progress of Aerial Locomotion. Pp. 526–527.

Hayward, R. B. Audibility of the Sound of Firing on February 1. Pp. 538–540.

Buchanan, J. Y. Solar Calorimeter depending on the rate of generation of Steam. Pp. 548–551.

Science. New York. N. S. Vol. 13.
Bigelow, F. H. Clayton's Eclipse Cyclone and the Diurnal Cyclones. Pp. 589-591.
American Journal of Science. New Haven. 4th series. Vol. 11.
Hallock, William. Very on Atmospheric Radiation. Pp. 230-234.
Scottish Geographical Magazine. Edinburgh. Vol. 17..
—— British Rainfall Organization. Pp. 194-195.
L'Aérophile. Paris. 9me Année.
Tatin, Victor. Étude sur les Aéronauts. Pp. 44-53.
Annalen der Physik. Leipzig. Vierte folge. Band 4.
Naber, H. A. Das Luftbarometer. Pp. 815-827.
Himmel und Erde. Berlin. 13 *Jahrg.*
Assmann, Richard. Die modernen Methoden zur Erforschung der Atmosphäre mittels des Luftballons und Drachens. P. 306-319.
Annuaire de la Société Météorologique de France. Paris. 49me année.
Angot, A. La variation diurne de la déclinaison magnétique et ses relations avec l'activité solaire. Pp. 19-26.

OBSERVATIONS AT HONOLULU.

Through the kind cooperation of Mr. Curtis J. Lyons, Meteorologist to the Government Survey, the monthly report of meteorological conditions at Honolulu is now made partly in accordance with the new form, No. 1040, and the arrangement of the columns, therefore, differs from those previously published.

Meteorological Observations at Honolulu, March, 1901.

The station is at 21° 18′ N., 157° 50′ W.

Hawaiian standard time is 10h 30m slow of Greenwich time. Honolulu local mean time is 10h 31m slow of Greenwich.

Pressure is corrected for temperature and reduced to sea level, and the gravity correction, −0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet, and the barometer 50 feet above sea level.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m., Greenwich time, or 2.29 a. m., Honolulu time.									Total rainfall at 9 a. m., local time.
				Temperature.		Means.		Wind.		Average cloudiness.	Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.		Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	30.02	72	67	77	63	.....	.....	ne.	2-0	10-0	30.11	30.00	0.01
2	29.89	74	71	81	66	65.3	72	e-sw.	2	4-10	30.02	29.90	0.63
3	29.98	69	62	75	68	65.0	83	w-e	3-0	10-4	29.99	29.86	0.01
4	29.97	70	63	74	64	59.0	66	ne.	2-4	4	30.05	29.94	0.01
5	30.06	69	62	75	68	50.0	65	ne.	5-2	8-2	30.10	30.00	0.00
6	30.02	70	66	74	69	61.7	73	ne.	5-6	7	30.10	29.99	0.48
7	30.06	72	67	76	69	64.7	77	ne.	5-6	8	30.12	29.97	0.03
8	30.09	72	65.7	77	71	63.5	72	ne.	4-2	7-10	30.15	30.03	0.00
9	30.08	69	66.5	76	72	63.3	70	ne.	4	7	30.16	30.08	0.15
10	30.02	70	66	76	68	64.3	82	ne.	3	8	30.10	30.02	0.47
11	30.01	71	64.5	76	69	63.3	74	ne.	4	6	30.06	29.98	0.15
12	30.02ª	71	66.5	78	71	63.3	72	ne.	3	5	30.08	29.96	0.11
13	30.01	67	64.5	78	70	64.0	73	ne.	3	3	30.07	29.96	0.02
14	30.00	68	66.8	79	67	64.7	76	ne.	3	3	30.05	29.96	0.40
15	30.02	71	65	77	66	66.3	82	ne.	3	5	30.06	29.96	0.15
16	30.03	70	65	76	70	63.3	73	ene.	3	2	30.09	29.99	0.01
17	30.04	65	64	78	69	64.0	73	ne.	3-1	2	30.08	30.00	0.01
18	30.07	71	65	79	64	63.5	77	ne.	3-4	3-9	30.10	30.00	0.13
19	30.10ª	71	61	76	68	63.3	75	ne.	3-5	5	30.15	30.04	0.57
20	30.00	69	66	75	67	61.3	68	ne.	4	8	30.16	30.06	0.33
21	30.07	71	64	78	68	64.0	75	ne.	5	5	30.16	30.06	0.01
22	30.03	70	64	76	69	60.5	65	ne.	4	8	30.13	30.02	0.01
23	29.96	70	67.5	77	69	62.0	68	ne.	3	3	30.06	29.94	0.02
24	29.95	70	68.7	80	70	65.5	74	ne	2	3	30.02	29.93	0.32
25	30.04	72	68.5	80	69	69.0	82	ese.	0-4	6	30.06	29.97	0.00
26	30.04	68	66.5	80	70	68.7	80	s.	0-1	6	30.09	30.02	0.02
27	30.02	70	65	79	67	65.3	77	nne.	2-4	8	30.10	30.01	0.00
28	29.96	62	60.7	75	70	60.5	70	nne.	4-2	7-3	30.05	29.96	0.00
29	29.86	65	61.5	76	60	60.7	75	ne.	2	6-0	29.98	29.88	0.02
30	29.92	65	64.3	80	60	63.5	76	s-e.	2	4	29.97	29.87	0.05
31	29.97	67	65.5	83	64	65.5	74	sw-ne.	1	2	29.99	29.87	0.00
Sums	......	......	......	.....	.....	.....	.....	....	.....	.....	......	......	4.12
Means	30.013	69.4	65.3	77.5	67.7	63.4	74.0	....	3.0	5.2	30.078	29.975	......
Departure	+.036	......	......	.....	.....	+1.9	+1.5	....	.....	+0.6	......	......	+0.82

Mean temperature for March, 1901 (6 + 2 + 9) ÷ 3 = 72.5; normal is 71.5. Mean pressure for March, 1901 (9 + 3) ÷ 2 = 30.023; normal is 29.987.

*This pressure is as recorded at 1 p. m., Greenwich time. †These temperatures are observed at 6 a. m., local, or 4.31 p. m., Greenwich time. ‡These values are the means of (6 + 9 + 2 + 9) ÷ 4. §Beaufort scale. ªValues interpolated.

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physical Geographic Institute.

TABLE 1.—*Hourly observations at the Observatory, San Jose de Costa Rica, during March,* 1901.

Hours.	Pressure.		Temperature.		Relative humidity.		Rainfall.		
	Observed, 1901.	Normal, 1889-1900.	Observed, 1901.	Normal, 1889-1900.	Observed, 1901.	Normal, 1889-1900.	Observed, 1901.	Normal, 1889-1900.	Duration, 1901.
	660+ Mm.	660+ Mm.	° C.	° C.	%	%	Mm.	Mm.	Hrs.
1 a. m	4.62	3.84	17.06	16.64	79	81	0.0	0.1	0.00
2 a. m	4.27	3.42	16.75	16.45	80	84	0.0	0.1	0.00
3 a. m	4.13	3.29	16.48	12.25	80	85	0.0	0.0	0.00
4 a. m	4.13	3.18	16.24	16.11	80	85	0.0	0.0	0.00
5 a. m	4.30	3.40	16.01	16.01	81	84	0.0	0.0	0.00
6 a. m	4.62	3.82	15.29	15.92	80	84	0.0	0.0	0.00
7 a. m	4.94	4.27	17.05	16.99	75	81	0.0	0.0	0.00
8 a. m	5.21	4.63	19.36	18.98	67	71	0.0	0.0	0.00
9 a. m	5.43	4.79	21.72	21.52	59	64	0.0	0.0	0.00
10 a. m	5.48	4.66	23.89	23.77	54	57	0.0	0.0	0.00
11 a. m	5.19	4.37	25.05	25.10	50	54	0.0	0.0	0.00
12 m	4.72	3.94	26.15	26.01	48	52	0.0	0.0	0.00
1 p. m	4.11	3.37	26.43	26.48	48	51	0.0	0.1	0.00
2 p. m	3.62	2.78	26.09	25.87	49	53	0.0	1.1	0.00
3 p. m	3.23	2.47	25.11	24.58	54	57	0.0	1.2	0.00
4 p. m	3.16	2.43	23.25	22.90	60	62	0.0	2.3	0.00
5 p. m	3.35	2.63	21.48	21.61	66	68	0.0	1.8	0.00
6 p. m	3.70	3.03	20.04	19.85	73	75	0.0	1.3	0.00
7 p. m	4.14	3.53	19.28	18.79	77	79	0.0	1.4	0.00
8 p. m	4.52	3.99	18.85	18.33	77	81	4.4	0.8	1.00
9 p. m	4.85	4.34	18.26	17.85	79	82	8.6	0.6	1.00
10 p. m	5.08	4.56	17.85	17.42	80	83	11.4	0.9	1.00
11 p. m	5.12	4.87	17.56	17.17	80	84	0.0	0.2	0.00
Midnight	4.88	4.30	17.25	16.91	80	84	0.0	0.5	0.00
Mean	4.45	3.72	20.13	19.87	69	73	......	......	......
Minimum	661.40	659.93	12.2	9.9	......	......	......	......	......
Maximum	668.60	667.22	30.8	32.6	......	......	11.4	2.3	......
Total	......	......	......	......	......	......	24.4	14.2	3.00

REMARKS.—The barometer is 1,169 meters above sea level. Readings are corrected for gravity, temperature, and instrumental error. The dry and wet bulb thermometers are 1.5 meters above ground and corrected for instrumental errors. The hourly readings for pressure, wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The hourly rainfall is as given by Hottinger's self-register, checked once a day. The standard rain gage is 1.5 meters above ground.

TABLE 2.

Time.	Sunshine.		Cloudiness observed, 1901.	Temperature of the soil at depth of—				
	Observed, 1901.	Normal, 1889-1900.		0.15 m.	0.30 m.	0.60 m.	1.20 m.	3.00 m.
	Hours.	Hours.	%	° C.	° C.	° C.	° C.	° C.
7 a. m	7.92	12.94	28	21.23	21.76	21.98	20.95	....
8 a. m	25.69	23.80						
9 a. m	23.81	23.77						
10 a. m	25.35	22.72	41	21.65	21.78	22.00	21.01	....
11 a. m	23.79	22.25						
12 m	22.54	21.78						
1 p. m	20.91	22.07	51	22.56	22.11	22.02	21.05	....
2 p. m	21.55	22.64						
3 p. m	22.94	20.74						
4 p. m	20.03	17.64	63	22.87	22.34	22.07	20.95	....
5 p. m	13.69	12.90						
6 p. m	6.81	4.78						
7 p. m	....	....	48	22.55	22.32	22.03	20.94	....
8 p. m	....	....						
9 p. m	....	....						
10 p. m	....	....	30	22.16	22.19	21.98	20.94	....
11 p. m	....	....						
Midnight	....	....						
Mean	....	....	44	22.17	22.10	22.02	20.99	20.74
Total	234.53	227.98	....	....	....	....	....	....

Notes on the weather.—During the first fortnight the weather was normal for the season, although very dusty and close. The night from 16th to 17th was stormy, with rather low temperature and high pressure. The strong northeast wind continued blowing from the 17th to 21st. On the 23d a decided change was noted in the higher currents of the atmos-

phere, which turned from northeast to southwest. From the 24th to 26th very hot, with threats of rain in the afternoon, and very dense smoke everywhere in the San Jose and Alajuela basins. From the 27th to the end of the month the northeast trade wind was again dominating from the surface of the country up to the highest strata of the atmosphere, as indicated by the clouds.

Notes on earthquakes.—March 11, 2h. 51m. 30s., a. m., heavy shock, west to east; intensity, 3; duration, 16 seconds. March, 12, 4h. 44m. p. m., slight shock, northeast to southwest, intensity, 2; duration, 2 seconds.

TABLE 3.—*Rainfall at stations in Costa Rica*, 1901.

Stations.	January.		February.		March.	
	Amount.	No. rainy days.	Amount.	No. rainy days.	Amount.	No. rainy days.
	Mm.		*Mm.*		*Mm.*	
1. Boca Banano	265	17	98	11	278	14
2. Limon	304	19	72	9	214	15
3. Swamp Mouth	......	......	131	10	241	13
4. Zent	......	......	......	......	......	......
5. Gute Hoffnung	411	15	106	14	224	12
6. Siquirres	406	10	45	4	160	8
7. Guapiles	340	13	114	8	......	......
8. Sarapiqui	......	......	......	......	......	......
9. San Carlos	301	19	67	14	96	13
10. Las Lomas	521	16	131	10	181	14
11. Peralta	335	11	65	4	190	13
12. Turrialba	......	......	......	......	......	......
13. Juan Vinas	159	14	40	10	12	6
14. Santiago	......	......	......	......	......	......
15. Paraiso	......	......	......	......	......	......
16 San Rafael C	......	......	......	......	......	......
17. Tres Rios	2	1	5	1	0	0
18. La Palma	......	......	......	......	......	......
19. S. Francisco G	7	2	9	1	26	1
20. San Jose	4	2	9	1	24	1
21. La Verbena	......	......	5	2	6	2
22. Alajuela	0	0	1	1	......	......
23. Nuestro Amo	......	......	11	2	50	8
24. Sipurio	......	......	......	......	149	12

DAMAGE BY HAIL IN SPITE OF CANNONADING.

By Prof. J. M. PERNTER.

[Translated from the Meteorologische Zeitschrift for March, 1901, page 135.]

In the January number of the Meteorologische Zeitschrift we stated with what exuberant certainty the great majority of the participants in the congress at Padua asserted the efficacy of the cannonading against hail. There were really no satisfactory proofs of this assertion and we stated the conditions that must be fulfilled by any acceptable demonstration of the fact. Practically, however, as the matter now stands it is greatly to be desired that we should know exactly what results have been obtained, and for this purpose we must not only be informed as to the successes, but also as to the failures. In spite of the very proper demand of Professor Poggi these latter never came up for close demonstration and discussion at the Padua congress; the members of the congress would not admit that there had been any failures. Nevertheless, it is necessary to know about them. Since in order to judge of the truth of the matter it is necessary for the meteorologist to be informed as to these details, we would call attention to the report for the last year's cannonading season, made by the inspector-general of the Italian Hail Insurance Company to the directors in Milan (Relazione dell' ispettore generale, Ingegnere Giuseppe Stabilini, sull' esito spari contro le nubi nel 1900 e nel congresso grandinifugo tenuto in Padova nel Novembre 1900). In this report Señor Stabilini cites 16 cases in which, so far as can be seen, he is actually in a position to show that in spite of all the severe and prolonged shooting some severe hail and some very severe damage from hail was done in the cannonading region itself. The accuracy of these facts is quite beyond doubt. It is so much the more to be regretted that the Weather Shooting Congress in Padua did not take advantage of the opportunity to investigate these cases more fully. For each case we should know: (1) the area of the region provided with cannonading apparatus; (2) its extent in latitude and longitude; (3) the distances of the cannon from each other; (4) the dimensions of the cannon; (5) the quantity of the charges of powder and the frequency of shots. If, further, the path of the storm and hail were given, then a discussion of the causes of failure in each case might profitably have taken place. On the authority of his report, Señor Stabilini concludes that the cannonading is almost useless. This is, however, too hasty a conclusion and not logically justified by the report. It is, however, very disquieting that in so many cases heavy and most severe damage should have been done in spite of the "best shooting."

I repeat again and again that it appears to me most probable that the smallness of the apparatus and the light charges have, through the facts brought forward by Señor Stabilini, now been proved to be insufficient; it does no good to shut our eyes to the facts.

Professor Pernter has elsewhere stated his desire that the heaviest charges of powder may be used, and the most thorough local investigation be made in order that the efficacy of cannonading be proved or disproved once for all. He considers the current delusion as an admirable chance to promote the study of thunderstorms and hail.—ED.

MONTHLY STATEMENT OF AVERAGE WEATHER CONDITIONS FOR MARCH.

By Prof. E. B. GARRIOTT.

The following statements are based on average weather conditions for March, as determined by long series of observations. As the weather of any given March does not conform strictly to the average conditions, the statements can not be considered as forecasts:

In March the storms of the middle latitudes of the North Atlantic Ocean are more numerous but less severe than during January and February. Fresh southerly winds prevail from the British Isles to the Grand Banks, and northwest winds from the Grand Banks to the United States coast. But little fog is encountered in the transatlantic steamship tracks. The southward movement of icebergs over the Banks of Newfoundland usually begins late in February or early in March. In the West Indies severe wind storms seldom occur during the dry season, which continues from November to April.

Although the wet season in the Pacific coast States of the United States continues from October to May, fully one-half of the annual rainfall occurs from December to February. In the Plateau regions the monthly rainfalls do not differ materially during the fall, winter, and spring months. Over the Great Plains which stretch from the Rocky Mountains to the Mississippi River, the monthly rainfall increases from February to June. East of the Mississippi the differences in the monthly rainfalls are not conspicuous, except that there is a general tendency toward a maximum in the summer months.

Although heavy snowstorms are practically unknown in the Southern States in March, and of infrequent occurrence in the northern districts, some very remarkable and memorable snowstorms have visited the northern districts of the United States in that month, principal among which may be placed the great storm of March, 1888, which proved so destructive to life and property in the Northeastern States. All of the severe March snowstorms of the Northeastern States have attended storms which have advanced from the southwest quarter.

The period of damaging frosts in the interior of the South Atlantic and Gulf States extends from November to April. Damaging frost is likely to occur in Florida from the middle of October until nearly the middle of April. Freezes of a character to injure oranges and orange trees in Florida, are, however, practically unknown in March.

NOTES BY THE EDITOR.

SNOW CRYSTALS.

On page 541 of the MONTHLY WEATHER REVIEW for December, 1900, we have referred to the extensive collection of snow crystals accumulated by Mr. W. A. Bentley, of Nashville, Vt., by the process of micro-photography. Mr. Bentley has kindly promised that the readers of the MONTHLY WEATHER REVIEW shall be favored with a very complete series of photographs and notes, and the Editor hopes by this publication to contribute to the foundation of our knowledge of the formation of clouds and rain. In Appleton's Popular Science Monthly for May, 1898, Mr. Bentley published a first account of some of his general deductions from the study of the snowflakes and the weather that is associated with them. By permission of the editor we reproduce some paragraphs from that work:

Careful examination of the illustrations will soon convince one that, great as is the charm of outline, the internal ornamentation of snow crystals is far more wonderful and varied. Many of the specimens, we might almost say all of them, exhibit in their interior most fascinating arrangements of loops, lines, dots, and other figures in endless variety. So far as is known to the writer, the illustrations are the first that have been published which show in any adequate manner these interior figures, and surely they add greatly to our interest and delight as we study snow crystals. So varied are these figures that, although it is not difficult to find two or more crystals which are nearly, if not quite the same in outline, it is almost impossible to find two which correspond exactly in their interior figures.

It is asserted by some observers that many of the lines or rods seen in the interior of snow crystals are really tubes filled with air.

Perfect crystals are by no means always common in snowstorms, most of the forms produced being more or less unsymmetrical or otherwise imperfect. It rarely happens that during a single winter there are more than a dozen good opportunities for securing complete crystals, and there may not be half so many. The greater number of perfect crystals is found in widespread storms or blizzards, while the local storms produce most often granular or imperfect forms. So marked is this distinction that very often the character and extent of a storm may be in general determined by an examination of the crystalline forms obtained. Extensive storms produce smaller crystals, more uniform in size, less clustered in flakes, and in greater variety than local storms. When the temperature is very low while a local storm is raging, its crystals resemble those of the blizzard more closely.

Some forms are common to both classes of storms. Probably because identical conditions do not occur frequently, the crystalline forms of each storm during a winter may differ from each other, one type appearing abundantly in one storm, a different type in the next, and so on. Conversely, the types most common in a given storm may reappear after an interval of months or years.

Not only do different storms afford different types of crystals, but different parts of the same storm, if it be general, give different forms. In this region the northern and western portions of the storm area produce more perfect crystals than the southern and eastern, and from this we infer a difference in the atmospheric conditions in these portions, the former being more quiet and otherwise favorable to crystallization.

In what has been called granular snow we find only loose, irregular subcrystalline forms, which are larger and heavier than others. This is formed in the middle or lower cloud layers, and when these are disturbed by wind or otherwise rendered unsuitable for crystallization. Sometimes, perhaps always, these granular masses have nuclei of true crystals. Granular snow may explain the origin of the great raindrops which often fall during a thundershower. It is probable that such drops have a snow origin. Most, if not all, hailstones also originate in granular snow, as their thin, opaque centers and concentric rings of opaque, snowlike ice show.

* * * * * * *

It is unfortunate that the depth and solidity seen in some crystals, when the photographs are mounted as stereoscopic views, can not be in some adequate manner reproduced in engravings, for this adds not a little to an understanding of the manner in which the crystals have been formed. * * * A careful study of this internal structure not only reveals new and far greater elegance of form than the simple outlines exhibit, but by means of these wonderfully delicate and exquisite figures much may be learned of the history of each crystal, and the changes through which it has passed in its journey through cloudland. Was ever life history written in more dainty hieroglyphics? It is well known that crystals which form in a low temperature are smaller and more compact than those formed in a warmer atmosphere. As the higher cloud strata are colder than those nearer the earth, the snow crystals which originate there are smaller and less branched than those from lower clouds. * * * The small compact crystals of the upper clouds do not always remain of their original form and size, for, as they fall through layer after layer of clouds, each layer subjecting them to its own special conditions, they may be greatly modified, and by the time they reach the earth they may closely resemble the crystals from lower clouds, though they can usually be distinguished from them by an examination of the internal structure, as well as by, in some cases, their general form. All crystals falling from high cloud strata, the cirrus or cirro-stratus, are not changed; especially is this true in a great storm, or when the temperature of the lower clouds is low, and in any case some are much more completely transformed than others. One crystal may pass through cloud layers not very unlike that from which it came, and of course will not be greatly changed. Another may encounter here a quiet cloud layer and there a tumultuous layer; here a lower, there a higher temperature; here a dense and there a thin cloud mass; and by all of these conditions may be affected. * * * Total transformation, such as the change from one type into another, does not often occur. The nucleus retains its original form, to which various additions are made during the downward passage. Composite crystals may, however, be formed during the passage through diverse cloud layers, though they are not common. Usually, however, the tabular, compact, small crystals of the high clouds continue their development at lower levels upon the original plan, though becoming larger and more complex by the addition of branches at the angles. The triangular forms are less common than the others figured, and occur usually in the greater storms. A very unique composite crystal, which beginning in the higher clouds as a simple hexagon, received the peculiar additions which are well shown in one of the figures. An exceedingly unusual figure is that of a composite crystal formed from two, each of which has been in some way broken apart, and the portions then so brought in contact as to unite and form a single crystal of very nearly the original form of each of its parts.

CHARTS OF ATMOSPHERE HUMIDITY.

At the last meeting of the British Association for the Advancement of Science Dr. E. G. Ravenstein read a paper on the geographical distribution of relative humidity, a summary of which was given in the annual report of the association for 1900, page 817, about as follows:

Dr. Ravenstein stated that the importance of relative humidity as a climatic factor was fully recognized. Having illustrated its influence upon organic life, upon agriculture and human industries, he expressed his regret that neither in number nor in trustworthiness did humidity observations meet the requirements of a person desirous of illustrating its distribution over the globe by means of a map. This was owing largely to defects in the instruments employed, incompetence of the observers, and unsuitability of the hours chosen for the observations. As to the humidity over the ocean, we were still dependent upon the observations made on board passing vessels, and he was afraid the time had not yet come when floating meteorological observatories would be stationed permanently throughout a whole year at a few well-chosen localities in mid ocean. Notwithstanding this paucity of available material, he had ventured, in 1894, to publish in Philip's Systematic Atlas a small chart of the world showing the distribution of humidity. The subject had not been lost sight of by him since then, and he now placed the results before this meeting. He did so with some diffidence, and over cautious meteorologists might condemn his action, but they must remember that when Berghaus, in 1838, acting upon suggestions made by Zimmermann and Humboldt, published the first isothermal chart, the observations on temperature were even less numerous than those on humidity were at present. His charts, of course, must be looked upon as sketches, but he felt confident that

they brought out the broad features of the subject, and to reduce the sources of error he had limited himself to indicating four grades of mean annual humidity, the upper limits of which were, respectively, 50 per cent (very dry), 65 per cent, 80 per cent, and 100 per cent (very damp). The relative humidity over the ocean might exceed 80 per cent, but in certain regions (horse latitudes) it was certainly much less, and in a portion of the Southern Pacific it seemed not to exceed 65 per cent, a feature seemingly confirmed by the salinity of that portion of the ocean which exceeded 3.6 per cent.

His second chart exhibited the annual range of humidity, viz, the difference between the driest and the dampest months of the year. In Britain, as in many other parts of the world, where the moderating influence of the ocean was allowed free scope, this difference did not exceed 16 per cent, but in the interior of the continents it occasionally exceeded 45 per cent, spring or summer being exceedingly dry, whilst the winter was excessively damp, as at Yarkand, where a humidity of 30 per cent in May contrasted strikingly with a humidity of 84 per cent in December.

This great range directed attention to the influence of temperature (and of altitude) upon the amount of relative humidity, for during temperate weather we were able to bear a great humidity with equanimity, whilst the same degree of humidity accompanied by great heat, such as is occasionally experienced during the "heat terms" of New York and recently in London, may prove disastrous to men and beasts. Hence, combining humidity and temperature, the author suggested mapping out the earth according to sixteen *hygrothermal types*, as follows:

1. Hot (temperatures 73° and over) and very damp (humidity 81 per cent or more): Batavia, Camaroons, Mombasa.
2. Hot and moderately damp (66-80 per cent): Havana, Calcutta.
3. Hot and dry (51-65 per cent): Bagdad, Lahore, Khartum.
4. Hot and very dry (50 per cent or less): Disa, Wadi, Halfa, Kuka.
5. Warm (temperature 58° to 72°) and very damp: Walwisch Bay, Arica.
6. Warm and moderately damp: Lisbon, Rome, Damascus, Tokio, New Orleans.
7. Warm and dry: Cairo, Algiers, Kimberley.
8. Warm and very dry: Mexico, Teheran.
9. Cool (temperature 33° to 57°) and very damp: Greenwich, Cochambo.
10. Cool and moderately damp: Vienna, Melbourne, Toronto, Chicago.
11. Cool and dry: Tashkent, Simla, Cheyenne.
12. Cool and very dry: Yarkand, Denver.
13. Cold (temperature 32° or less) and very damp: Ben Nevis.
14. Cold and moderately damp: Tomsk, Pikes Peak, Polaris, House.
15. Cold and dry.
16. Cold and very dry: Pamir.

The actual mean temperature of the earth amounted, according to his computation to 57° F., and this isotherm, which separated types 8 and 9, also divided De Candolle's "Mikrothermes" from the plants requiring a greater amount of warmth.

The author fully illustrated his paper by a number of diagrams giving the curves of the temperature, rainfall, and humidity, and also by a chart of the world exhibiting the number of rainy days.

J. BROWN HICKLIN.

We regret to announce the death of Mr. J. Brown Hicklin on March 21, 1901. Mr. Hicklin entered the Weather Bureau on February 1, 1897, by transfer from the Government Printing Office. His entire service in the Bureau was performed at the Denver, Colo., station. The reports from the official in charge at that point were invariably favorable to Mr. Hicklin. He was industrious, painstaking, and reliable in every respect.—*D. J. C.*

NORMALS FOR MANILA.

The Manila Observatory has lately published, in a convenient pamphlet form, its normal climatological data. The pressure, temperature, and humidity data are based upon the years 1883-1898, during which period hourly observations have been made night and day. The rainfall data represent the longer period, from 1865-1898. The barometric record has been reduced to sea level, but it is not definitely stated that the mean values have been reduced to standard gravity. The latitude of Manila is 14° 35′ N., and the mean height of the barometer is 759.31 millimeters, or 29.89 inches, the correction for gravity is, therefore, —1.77 millimeters, or —0.070 inch, which correction is probably still to be applied to the figures given in the table below in order to conform to the rules of the International Meteorological Congress and Committee.

TABLE 1.—*Normal atmospheric pressures at Manila*, 1883-1898.

Month.	Mean.	Highest mean.	Lowest mean.	Absolute maximum.	Absolute minimum.
	Inches.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
January	29.97	30.06	29.91	30.21	29.71
February	29.98	30.04	29.89	30.19	29.68
March	29.95	30.02	29.85	30.15	29.65
April	29.90	29.95	29.88	30.06	29.67
May	29.86	29.92	29.82	30.08	29.38
June	29.85	29.88	29.81	30.02	29.50
July	29.82	29.87	29.76	30.00	29.48
August	29.83	29.87	29.80	30.02	29.53
September	29.83	29.90	29.77	30.03	29.23
October	29.88	29.93	29.82	30.05	29.45
November	29.90	29.98	29.81	30.16	29.27
December	29.96	30.02	29.88	30.16	29.54
Annual	29.89	30.06	29.76	30.21	29.23

TABLE 2.—*Normal temperatures at Mani a*, 1883-1898.

Month.	Mean.	Highest mean.	Lowest mean	Absolute maximum.	Absolute minimum.
	°*F.*	°*F*	°*F.*	°*F.*	°*F.*
January	77.0	78.4	74.5	93.0	62.1
February	77.7	79.5	75.9	95.7	61.0
March	80.4	81.9	79.0	95.9	63.3
April	82.9	84.9	81.1	99.0	66.0
May	83.3	86.5	81.7	100.0	71.1
June	82.0	85.1	80.6	97.0	70.9
July	80.8	81.5	79.0	94.8	70.0
August	80.8	81.9	79.5	94.3	69.1
September	80.4	81.7	79.3	93.7	70.5
October	80.4	81.5	:9.0	94.8	68.7
November	79.0	80.2	77.7	92.1	64.9
December	77.4	78.8	75.4	91.9	60.3
Annual	80.2	86.5	74.5	100.0	60.3

TABLE 3.—*Normal atmospheric moisture at Manila*, 1883-1898.

Month.	Relative humidity.			Vapor pressure		
	Mean.	Maximum.	Minimum.	Mean.	Absolute maximum.	Absolute minimum.
	Per ct.	*Per cent.*	*Per cent.*	*Inches.*	*Inches.*	*Inches.*
January	77.7	100.0	40.0	0.713	1.024	0.469
February	74.1	100.0	33.0	0.697	0.902	0.382
March	71.7	100.0	31.5	0.736	1.142	0.390
April	70.9	100.0	33.0	0.784	1.138	0.472
May	76.9	100.0	32.0	0.866	1.122	0.508
June	81.5	100.0	36.0	0.886	1.067	0.587
July	84.9	100.0	52.5	0.882	1.075	0.677
August	84.4	100.0	52.0	0.882	1.083	0.689
September	85.6	100.0	51.0	0.886	1.071	0.614
October	82.6	100.0	46.0	0.850	1.051	0.559
November	81.6	100.0	39.0	0.799	1.016	0.441
December	80.7	100.0	39.5	0.752	1.055	0.453
An ual	79.4	100.0	31.5	0.811	1.142	0.382

TABLE 4.—*Normal rainfall at Manila*, 1865-1898.

Month.	Mean.	Highest mean.	Lowest mean.	Greatest Daily.
	Inches.	*Inches.*	*Inches.*	*Inches.*
January	1.193	7.685	0.020	7.327
February	0.413	1.559	0.000	1.496
March	0.736	3.945	0.000	2.362
April	1.142	5.370	0.000	1.724
May	4.197	10.114	0.000	6.567
June	9.622	25.807	0.976	9.949
July	14.567	31.882	5.276	11.421
August	13.866	43.134	5.150	8.917
September	14.925	57.862	2.000	13.228
October	7.536	23.217	1.555	6.772
November	5.126	15.662	1.173	7.110
December	2.134	13.658	0.008	3.543
Annual	75.457	57.862	0.000	13.228

TABLE 5.—*Mean winds, Manila*, 1865-1898.
(As read off by the Editor from Fr. Algué's diagrams.)

Month.	Resultant direction.	Relative frequency.			
		Direction.	Nov.-May.	June-Oct.	Annual.
	°		*Per cent.*	*Per cent.*	*Per cent.*
January	n. 50 e.	n.	8	4	7
February	n. 80 e.	nne.	7	4	6
March	s. 80 e.	ne.	9	5	7
April	s. 45 e.	ene.	5	3	4
May	s. 20 e.	e.	11	5	8
June	south	ese.	9	4	6
July	s. 40 w.	se.	6	4	5
August	s. 45 w.	sse.	2	3	3
September	s. 45 w.	s.	2	6	3
October	s. 80 e.	ssw.	2	9	5
November	n. 30 e.	sw.	5	17	9
December	n. 20 e.	wsw.	7	9	7
		w.	6	6	5
Annual	s. 45 e.	wnw.	2	2	2
		nw.	2	3	2
		nnw.	2	2	2
		n.	8	4	7
Resultant			n. 70.5° e.	s. 32.7° w.	s. 85.7° e.

THE NEW PHILIPPINE WEATHER SERVICE.

As is well known, the Observatory at Manila has been maintained for many years by the Jesuit Fathers under the Spanish administration, and embraced the subjects of astronomy, seismology, and meteorology. About 1894, Father Joseph Algué was transferred from Havana to Manila, and within the next few years distinguished himself by his activity in the study of typhoons. He subsequently became the director of the observatory, and as such, in 1899, had occasion to visit Washington, D. C., on behalf of the first Philippine Commission (of which Professor Schurman was president) here he remained a year superintending the publication of his extensive report to the commission on the climatology and geography of the Philippine Archipelago. The original Spanish edition of this report is already published, and the English summary will appear in the second volume of the commission's report to Congress, dated January 31, 1900, and published as Senate Doc. No. 138, Fifty-sixth Congress, first session.

Early in 1900, in an interview with the Secretary of Agriculture, Father Algué proposed that the United States should organize a meteorological system for the Philippines, placing it in charge of the Chief of the Weather Bureau, who should make the Manila Observatory the headquarters of the Philippine service. On the other hand, Professor Moore urged that it would be best that the Philippine system should be independent of the United States Weather Bureau; that it should be supported by the funds of the Philippine government rather than those of the United States; that Father Algué himself should be the director, and that the United States Weather Bureau would cooperate and render all the assistance possible. Professor Moore's plan was agreed to by Secretary Wilson, and adopted by the Philippine Commission, Secretary Wilson stating, however, that as soon as enough of the islands of the Pacific are connected by cable, it will be advisable for the United States Government to organize an extensive storm-warning system with the Philippine service incorporated under Federal direction.

Father Algué, during the rest of his stay in the United States, consulted with the various officials of the Weather Bureau and studied its methods. Since returning to Manila he has organized the Philippine system on lines parallel to those that characterize the Weather Bureau. As far as practicable, the same apparatus and methods have been adopted and the following extract from his letter to Professor Moore, dated February 17, shows the rapid progress that is being made:

MY DEAR PROFESSOR:

Most of the instruments intended for the first class stations of the Philippine weather service are at hand, and a few will be made in our mechanic's shop. The United States Philippine Commission[1] has established civil government in some provinces, and there will be a chance to open a few stations on the islands before the coming of the full typhoon season in May. I expect that by that time there will be some twenty telegraphic stations scattered over the islands: everything is done in accordance with the plan approved by you about the end of March, 1900. If this be entirely executed, as you suggested, here will be one of the finest meteorological and seismical *reseau* (network of stations) in existence in any colony over the world.

The mail will bring you a new pamphlet recently published on a typhoon felt in Manila about the 8th of September, 1900 (the very day of the Galveston cyclone.) The pamphlet proved to be very welcome in Manila and in Asia. I confine myself to quoting to you only one instance, viz, the following letter which was received yesterday:

UNITED STATES NAVAL STATION,
CAVITE, PHILIPPINE ISLANDS,
February 15, 1901.

"*The Director Observatorio de Manila:*

DEAR SIR: I beg to thank you for a copy of your most interesting publication on the storm which prevailed in this vicinity on the 8th of September, last. While I was not in command of this station on that date, I was informed by my predecessor how extremely valuable the telegrams from the Manila Observatory were in guiding him in his disposition of the numerous yard launches and other craft.

With renewed expressions of my regard for the Observatorio de Manila, believe me,

Yours, very respectfully,
F. HANFORD, *Commander, U. S. N.*,
Commandant, United States Naval Station, Cavite, P. I."

WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. H. B. Boyer, Local Forecast Official at Savannah, Ga., states that he has met with some success in stimulating public interest in Weather Bureau work. On several occasions Prof. Otis Ashmore delivered lectures on meteorology to the teachers of the public schools; Prof. T. S. Lucas, of the High School, has been giving some instruction as to the lessons taught by the weather map; Prof. D. C. Suggs, of the Georgia State Industrial College (colored), has also requested maps as an aid to his classes in the study of physical geography. Applications for maps have been received from the Southern Normal Institute, Douglas, Ga., and the teacher of a school in Whitley, Ga. A cordial invitation was extended by Mr. Boyer to the public school teachers, which resulted in high school and grammar school classes visiting the office, where the instruments were shown and explained.

Mr. Alfred F. Sims, Local Forecast Official, Albany, N. Y., lectured on Monday, March 18, at the Albany High School, on the "Musings of a meteorologist." On March 26 he lectured on the growth of the globe and its atmosphere, under the title, "Glimpses into nature's laboratory."

Mr. Charles Stewart, Observer Weather Bureau, Spokane, Wash., lectured, January 29, to the students of the Blair Business College; February 13 at St. Stephen's School, and March 20 at Gonzaga College.

Mr. S. M. Blandford, Section Director at Boise, Idaho, lectured to the instructors and students at St. Margaret's Academy, Boise, Idaho, on the 16th of March, on barometric pressure, precipitation, temperature, clouds, and wind movement in cyclonic and anticyclonic areas.

DUST STORMS AND RED RAIN.

In previous numbers of the MONTHLY WEATHER REVIEW we have described several dust storms; a general article on that subject, by Prof. J. A. Udden, was published in the Popular Science Monthly for September, 1896. In this article

[1] That of which Judge Taft is president.

Professor Udden estimates the load of sand and dust that may be carried by the atmosphere under different conditions as to wind and soil. His estimates vary from 0.0009 grams per cubic foot, or 160 tons per cubic mile, as appropriate to a thick haze up to 0.77 grams per cubic foot, or 126,000 tons per cubic mile in the case of the highest estimate based on the quantity of sand found in dwellings. He finds the quantity of work done by the atmosphere in transporting soil to be about $\frac{1}{330}$ of the work done by the Mississippi River and its tributaries over the area of its watershed.

Recently the newspapers and scientific periodicals have contained accounts of a remarkable storm with falls of red rain or snow and red dust throughout southern Europe.

The International Decade Report for the first ten days of March says:

On March 10 and accompanying a depression traveling from Algeria to Pomerania, there occurred a sirocco with red dust in the morning in Sicily, in the afternoon in southern Italy; on March 11 there fell red and yellow dust generally with snow northward in Brandenburg and Pomerania, with east wind by midday, and over the lower Elbe and Weser with north wind by the evening of the 11th.

Prof. A. W. Rücker, of England, who had been staying some time at Taormina in Sicily, communicates the following interesting report. (See Nature, March 28, 1901, page 514.)

On March 12 the sirocco was blowing and the hills were wrapped in mist, but the fog assumed a yellow hue, and the sun, which at times could be seen through it, was a bright blue; this was caused and accompanied by a copious fall of red dust. Some which I shook off my hat was quite dry, and on looking at it through a low power lens all the granules seemed to be spherical, except a very few grains which looked like quartz. Of course, the question was raised whether Etna was ejecting something which corresponded to the Krakotoa dust, but this was negatived by the fact that the Italian papers state that the dust fell also at Naples and Palermo in such quantities that the streets looked red and the people were frightened. I scraped some off a marble table which I send you.

Under the microscope this dust is seen to be mainly composed of inorganic particles, chips of quartz in small quantities being mingled with minute plates of various micaceous and other minerals. There is also a fair admixture of frustules of fresh water diatomaceæ, entire and in fragments. The number and variety of these diatomaceæ does not appear to be so striking as in some of the celebrated cases described by Ehrenberg, the organisms from which were figured by him in his Passant Staub und Blut Regen, 1847. There are, however, a very considerable number of species represented in these recent falls.

On March 20 Professor Rücker says:

At 7:30 this morning the sky was copper colored, and it was evident that another fall of dust was taking place. The sirocco had been blowing for two days and it was raining slightly. The sky ceased to be copper colored about 8 or 8:15 a. m.

Under these circumstances he measured the dust that accumulated on various flat surfaces during the hour. The measurements gave the following results:

(a) 0.0010 grams per square inch; (b) 0.0017 grams per square inch. The average of these 0.00135, or about five and one-half tons per square mile gives a fair idea of the density of the dust in the region of Taormina.

In the Meteorologische Zeitschrift for March, 1901, pages 137–139, is a preliminary report on the dust storms of March 10, 11, from which we take the following items: The chart shows that a depression passed from the Algerian coast across Sardinia, Corsica, and northern Italy in a northeastern direction, and on the morning of the 12th was over west Prussia. Attending this distribution of pressure strong sirocco and high temperatures prevailed on the morning of the 11th throughout the Adriatic Sea, and the phenomena of 1879, February 24–25, described by Hann in his Meteorological Atlas were now again repeated. On that occasion as well as on the 15th of October, 1885, when a storm center moved over the same path, dust fell over Italy and the southern Alps and red-colored snow was observed near Vienna.

The dust was examined by Professor Perhanz both microscopically and chemically, and was found to be perfectly similar to the sands of the Desert of Sahara, as described by many authors. In Palermo the sky was covered with dark, red clouds after 8 a. m. of the 10th. The whole city appeared bathed in red; at noon time the drops of heavy rain looked like blood. At Naples, about 5:45 p. m. of the 10th, the sky became bright yellow and afterwards fiery red. The clothing of those in the street was entirely covered with dust. It was difficult to keep the eyelids open. Nothing like it had been seen in Naples since the eruption of Vesuvius in 1872. The phenomenon lasted about three hours.

On March 11 similar dust rains, or blood rains, prevailed over northern Germany. More complete reports are promised by Hann and Hellmann. One can easily see that we have here to do with a severe storm in the Sahara region, and by the attending winds the finer dust was raised and transported northward. Professor Salcher states that the dust is sirocco sand. Although the microscopic study of the dust in Germany has, so far as noted, revealed only mineral dusts, yet the Editor can not doubt that eventually diatom dust will also be found, similar to that which occurs when the harmattan carries the dust of the Sahara toward the west and southwest over the Atlantic Ocean. These diatoms are characteristic of the fresh-water marshes and ponds off the Sahara Desert.

This is the first time that Sahara dust has been known to be carried to England. The black rains of April, 1887, in Ireland, were undoubtedly due to the soot dust of soft-coal fires.

In January or February, 1890, the steamship *Queensmore*, arriving at Baltimore from England, reported red rain and red dust off the coast of Newfoundland. It would be very remarkable if this was Sahara dust.

THE PERMANENCE OF CLIMATE.

We quote the following excellent paragraph from a lecture recently delivered by Mr. A. F. Sims, Local Forecast Official, at Albany, N. Y., entitled "Some musings of a meteorologist."

Climate is a product of certain elements and properties of the atmosphere and physical features of the earth's surface. As these elements and conditions are substantially permanent, we have ample assurance of the stability of climate. The sun's energy is a physical constant producing in earth and air the results termed heat, light, and electricity, and causing the varied phenomena of evaporation and precipitation, wind movements, storms, etc. Nature gives us a warranty that the climate of a section will be practically unchanged so long as the continents and seas abide in their present forms and bounds and the mountains remain in place. All climatic records attest this fact of permanence. The student of climatology may find in the constituents of the soil ample proofs as to the weather conditions existing many thousands of years prior to the historic age, in like manner as the skilled geologist reads in the rocks the graphic story of nature's processes in world building, in the more distant epochs of the past. One of the obvious facts as to the climate of this section is the wide range of extremes and the marked variableness of the seasons as compared with the normal. This does not contravene the theory of the permanence of climate, but it simply implies that one of the permanent features of daily and seasonable weather is this tendency toward variations. Every season illustrates the fact that the law of variety holds sway in relation to the weather, as in all of nature's operations. One season is notable as a record breaker, in respect to sustained high temperatures, for many days during the summer; and the next season breaks the record for continued low temperature in the winter. So with substantial unity and stability, we note perpetual variety and changefulness in respect to the weather; irregularity is the thing to be expected. If a year should be strictly normal from first to last it would take rank as a phenomenal exception among all the years of record. Thus we reach the apparently paradoxical conclusion that in weather, the exceptional condition is the rule, and some measure of departure from the normal is the normal state of things.

THE MOON AND THE WEATHER.

The relations between the moon and various meteorological phenomena have been studied for a century past with great diligence, but hitherto nothing has been discovered to con-

firm the popular belief that the weather has a dependence upon or even an indirect relation with the condition of the moon. The origin of this belief in the lunar influence can be traced back to Arabia and the astronomers of Assyria and Chaldea, and it is maintained in various forms by all peoples that use the Arabic language or inherit the old Arabic folk lore. We know of no recent investigation into the connection between the moon and the Arabian weather, but all studies bearing on European or American weather show that the lunar influence is inappreciable. We believe that the only plausible exception to this statement is to be found in the studies of Mons. A. Poincaré (an engineer and meteorologist of Paris, and not to be confounded with Prof. H. Poincaré, the eminent mathematician). His study of the international daily charts of the Northern Hemisphere, published by the United States Signal Service, seems to indicate that when the moon is far south of the equator it has an appreciable influence in causing a general movement of the atmosphere southward, and vice versa when she is north of the equator; but this movement is only appreciable when we take the average barometric pressure for several days or a week; it is essentially a fortnightly tidal wave, and is not known to have any apparent influence upon the temperature, cloudiness, rainfall, or wind. It can not, then, be spoken of as an influence of the moon upon the weather.

The students of lunar influences are at present rejoicing in the patronage of a wealthy Russian railroad engineer, Mr. Nicolai Demtschinsky, of Torbino, Russia, who has flooded the scientific world with his prospectus and the first few sample numbers of a journal devoted to the exact prediction of the weather by means of the lunar influences.

The study of the influence of the moon on the atmosphere is certainly legitimate, but the study of the influence of the sun is also important, and it would be suicidal to neglect it. At the present time the trend of modern physics is to show that the sun's radiation produces all the thermal and most of the electric and optic phenomena of the atmosphere and that the modification introduced by the moon is scarcely worthy of consideration. The new journal states that—

> It aims to be the depository for all information upon the question of atmospheric ebb and tide, including therein, first, the influence of the moon on the atmosphere, and, second, the investigation of the upper strata of the atmosphere.

But, of course, every scientific journal is willing to publish investigations on these subjects. Investigations conducted by rational methods are precisely what is meant by science. All that has hitherto been found out about lunar influences and the upper strata of the atmosphere has already been published in scientific journals and memoirs. If any one in the United States has anything worthy of publication on this subject, he can make it known in the columns of the MONTHLY WEATHER REVIEW or the American Journal of Science even more easily than by sending it to Torbino, Russia. In fact, we can not but suspect that most of the articles published in a miscellaneous way had already been rejected by the editors of recognized scientific journals as containing assumptions and statements directly contrary to the known laws of nature. One may have the best of observational data, and yet go far astray when he attempts to reason upon it. The data that has been furnished to Mr. Demtschinsky by the Chief of the Weather Bureau during the past few years, and which is now quoted in his monthly journal, was communicated for his information, and the reader should not infer from the text of the journal that the Weather Bureau has any reason to adopt new doctrines that are contrary to observed facts and scientific principles.

ERRATA.

The following corrections should be made in the MONTHLY WEATHER REVIEW for 1898, Vol. XXVI:

Page 359, column 2, lines 12 and 13, after *v* in the formulæ insert the minus (—) sign.

Page 410, column 1, line 32, for XVI read XVII.

January, 1901, REVIEW, page 6, column 2, line 27 from bottom, for 460° F. read 492° F.; line 25 from bottom, for 530° read 562°.

THE WEATHER OF THE MONTH.

By ALFRED J. HENRY, Professor of Meteorology.

CHARACTERISTICS OF THE WEATHER FOR MARCH.

March, 1901, was characterized by the rapid movement eastward and northeastward of lows, many of which divided after crossing the Appalachians, and by the complete reversal of the conditions which obtained in the previous month as regards pressure distribution and movement of storms. About 70 per cent of the highs moved eastward along the Gulf coast and passed over the Atlantic in the neighborhood of the Carolinas. Temperature was above the average, except in the eastern Gulf States, Florida Peninsula, and the southern Plateau, and precipitation was irregularly distributed, but on the whole fairly abundant.

PRESSURE.

The distribution of monthly mean pressure is graphically shown on Chart IV and the numerical values are given in Tables I and VI.

The most noteworthy feature in the distribution of monthly mean pressure was the breaking up of the ridge of high pressure which in an average month stretches from Florida northwestward to the Dakotas. Mean pressure in the interior of the country was everywhere below normal by about the same amount as it was above normal in the preceding month. It will be remembered that during February, 1901, pressure was remarkably low over the North Atlantic and New England and high in the interior of the country. These conditions are reversed in the current month.

TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature, as deduced from the records of about 1,000 stations, is shown on Chart VI.

The month as a whole was warmer than usual. In the eastern Gulf States and on the Florida Peninsula, also in the Southwest, including Nevada and Colorado, temperature was below normal, ranging from 2° to 3°. In all other parts of the country, however, the temperature ranged from 3° to 6° above the seasonal average. Maximum temperatures of 100° and over were registered in the Rio Grande Valley, and maximum temperatures above 80° were quite general in southern Georgia, Florida, in the lower Mississippi Valley, the western

Gulf States, Oklahoma, Indian Territory, and Kansas. Maximum temperatures under 40° were recorded in northern Minnesota and the northern part of North Dakota. Freezing temperatures were experienced in all parts of the country save the central and southern parts of the Florida Peninsula and along the immediate Gulf and Pacific coasts. Minimum temperatures as low as 30° below zero were recorded in northeastern North Dakota.

The average temperature for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	10	33.3	+ 1.1	− 3.9	− 1.3
Middle Atlantic	12	42.0	+ 2.8	− 2.6	− 0.9
South Atlantic	10	54.6	+ 0.9	− 5.2	− 1.7
Florida Peninsula	7	63.6	− 2.0	− 7.8	− 2.6
East Gulf	7	57.4	− 1.0	− 5.1	− 1.7
West Gulf	7	58.3	+ 0.5	+ 3.8	+ 1.3
Ohio Valley and Tennessee	12	45.4	+ 1.3	− 4.0	− 1.3
Lower Lake	8	33.9	+ 1.6	− 5.6	− 1.9
Upper Lake	9	27.4	+ 0.8	− 0.9	− 0.3
North Dakota	8	26.0	+ 5.5	+12.3	+ 4.1
Upper Mississippi Valley	11	36.8	+ 1.0	+ 1.6	+ 0.5
Missouri Valley	10	37.8	+ 2.4	+ 9.8	+ 3.3
Northern Slope	7	34.6	+ 2.8	+ 8.4	+ 2.8
Middle Slope	6	42.0	0.0	+ 2.9	+ 1.0
Southern Slope	6	50.7	+ 0.8	+ 3.7	+ 1.2
Southern Plateau	15	46.5	− 1.0	+ 8.1	+ 2.7
Middle Plateau	9	39.1	+ 0.9	+ 9.4	+ 3.1
Northern Plateau	10	39.1	+ 2.2	+ 7.8	+ 2.6
North Pacific	9	44.8	− 0.4	+ 1.4	+ 0.5
Middle Pacific	5	54.0	+ 1.7	+ 3.2	+ 1.1
South Pacific	4	58.2	+ 2.7	+ 7.0	+ 2.3

In Canada.—Prof. R. F. Stupart says:

The temperature was above the average throughout the Dominion, except in the comparatively small portion of the country comprised in the area from the eastern part of the Lake Superior region to western Quebec, south to the north shores of the Georgian Bay district and the Ottawa and St. Lawrence rivers, where it was from average to 2° below. From the mainland of British Columbia to Manitoba the plus departure was large, amounting to as much as 9° and 10° in portions of Alberta and Assiniboia. Elsewhere, however, the average was very slightly exceeded.

PRECIPITATION.

The rainfall was fairly abundant in all regions except the lower Ohio Valley, the lower Mississippi Valley, the eastern Gulf States, eastern Texas, and the Pacific coast. In the last-named region there was a deficiency of as much as 3 inches on the California coast, and about an inch on the Washington and Oregon coasts. Rainfall was also generally deficient throughout the Plateau regions and in some portions of the middle Rocky Mountain region. The fall of snow was light in the middle Mississippi and Ohio valleys, the Middle States, and New England. Monthly snowfalls of from 10 to 20 inches occurred in northern Michigan, Wisconsin, Minnesota, and in Iowa and portions of Nebraska. The snowfall in the Rocky Mountain region seems to have been rather below than above the seasonal average.

The amount of snow on the ground at the end of the month was so small that the preparation of the usual chart has been omitted.

The distribution of snowfall is shown by Chart IX.

In Canada.—Professor Stupart says:

The precipitation was unevenly distributed in many respects. In Ontario and Quebec it was everywhere above the average, except in portions of the Ottawa Valley. In the Maritime Provinces the discrepancies between plus and minus were very marked. For instance, Sydney, Cape Breton, was about 1.6 above average, Charlottetown 1.7 below average, St. John 0.8 below average, Grand Manan 0.9 above average, Yarmouth average, Halifax 1.4 below average. In Manitoba the average was not quite maintained, especially in the neighborhood of Winnipeg, whereas in the territories in the north it was exceeded, and did not reach the average amount in the south. In British Columbia, Victoria was 2.2 inches below average, whereas on the mainland, Kamloops was half an inch below average, and Barkerville over half an inch above average.

At the end of the month deep snow still covered the Province of Quebec and also the northern portion of Ontario. Quebec reported 33 inches on the ground, Montreal 23 inches, Bissett 20 inches, White River 34 inches. In many portions of the Northwest Territories and also in northern New Brunswick there was more than a foot, but in southern localities generally the ground was either bare or patches of snow only remained.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	10	5.55	144	+1.7	−2.5
Middle Atlantic	12	3.63	96	−0.2	−3.9
South Atlantic	10	4.24	95	−0.2	−1.8
Florida Peninsula	7	4.87	164	+1.9	+1.6
East Gulf	7	5.53	93	−0.4	−0.9
West Gulf	7	2.23	65	−1.2	−4.6
Ohio Valley and Tennessee	12	3.48	81	−0.8	−5.6
Lower Lake	8	2.65	104	+0.1	−1.4
Upper Lake	9	2.82	140	+0.8	−0.9
North Dakota	8	0.82	89	−0.1	−0.6
Upper Mississippi Valley	11	2.72	123	+0.5	−0.9
Missouri Valley	10	2.07	117	+0.3	−0.5
Northern Slope	7	0.80	100	0.0	−0.4
Middle Slope	6	1.00	62	−0.6	−1.4
Southern Slope	6	0.23	19	−1.0	−1.8
Southern Plateau	15	0.49	45	−0.6	+1.0
Middle Plateau	9	1.16	85	−0.2	+0.1
Northern Plateau	10	1.02	67	−0.5	−0.7
North Pacific	9	4.26	78	−1.2	−0.7
Middle Pacific	5	1.27	31	−2.8	+0.2
South Pacific	4	0.61	28	−1.6	+1.9

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 1. Arizona, 8, 11, 28, 30, 31. Arkansas, 19, 29, 31. California, 10, 11, 22, 23, 25, 27, 28, 29, 30, 31. Colorado, 8, 12, 27. Connecticut, 11, 13, 14. District of Columbia, 1. Idaho, 31. Illinois, 1, 2, 3, 10, 13, 29, 30. Indian Territory, 19, 31. Iowa, 4, 6, 9, 10, 12, 13, 18, 19, 24, 25, 26. Kansas, 9, 29. Kentucky, 9, 10, 14, 20, 24, 25. Louisiana, 9, 23. Maine, 11, 12, 14. Maryland, 1, 4, 21, 27. Massachusetts, 5, 10, 11, 13, 14. Michigan, 1, 2, 3, 8, 10, 11, 12, 13, 14, 19, 20, 23, 30. Minnesota, 2, 3, 12, 13, 14, 19, 23, 29. Missouri, 9, 10, 19, 28, 29, 30. Montana, 2. Nebraska, 3, 4, 9, 12, 18, 23, 24, 25, 26, 29. Nevada, 11, 12, 23, 30. New Hampshire, 10, 11, 19, 21, 24, 26, 28. New Jersey, 1, 4, 5, 11, 14, 15. New York, 1, 2, 3, 4, 8, 9, 11, 13, 14, 15, 19, 27. North Dakota, 2, 7, 23, 24, 25. Ohio, 1, 2, 3, 8, 9, 10, 11, 12, 13, 14, 15, 20, 27, 30. Oklahoma, 19, 28, 31. Pennsylvania, 3, 4, 5, 11, 13, 14, 20, 27. South Carolina, 1. South Dakota, 11, 18, 23, 24, 29. Tennessee, 29. Texas, 31. Utah, 7, 8, 11, 13, 22, 23, 25, 26. Vermont, 3, 5, 6, 7, 9, 10, 11, 12. Virginia, 1, 4, 10. Washington, 9, 10, 25. West Virginia, 1, 3, 4, 5, 11, 28. Wisconsin, 3, 8, 10, 11, 12, 13, 14, 18, 19, 20, 21, 23, 24, 25, 26, 27. Wyoming, 8.

HAIL.

The following are the dates on which hail fell in the respective States:

Alabama, 15, 23, 25. Arizona, 6, 7, 8, 9, 29, 30, 31. Arkansas, 9, 10, 12, 19, 27, 28, 29, 30. California, 9, 10, 22, 25, 27, 28, 29, 30. Connecticut, 11. Florida, 23. Georgia, 1, 25. Idaho, 12, 17, 18, 22, 24, 25, 26, 27, 30, 31. Illinois, 9, 19, 20, 24, 25. Indiana, 14, 24, 25. Indian Territory, 18. Iowa, 12, 19, 23, 24, 25. Kansas, 28. Louisiana, 8, 9, 19, 22, 23, 24. Maine, 27. Maryland, 1, 4. Michigan, 3, 8, 10, 11, 13, 19, 25. Minnesota, 23. Nevada, 8, 11, 12, 22, 23, 24, 25, 26, 27, 31. North

Carolina, 5, 10, 24, 25, 26, 30, 31. Ohio, 10, 13, 24, 25, 26. Oklahoma, 9, 18, 19, 23, 28, 29. Oregon, 8, 9, 10, 11, 16, 17, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31. South Carolina, 9, 10, 14, 25, 26. South Dakota, 11, 24. Tennessee, 4, 10, 19, 25, 26. Texas, 9, 18, 19, 22, 29. Utah, 7, 8, 11, 12, 18, 22, 23, 24, 25, 26, 29, 30. Virginia, 10, 11, 25, 26. Washington, 2, 7, 9, 17, 21, 22, 23, 26, 27, 28, 31. Wisconsin, 9, 10, 18, 19, 23.

HUMIDITY.

The averages by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	76	+1	Missouri Valley	68	−4
Middle Atlantic	71	0	Northern Slope	68	+2
South Atlantic	69	−5	Middle Slope	58	−2
Florida Peninsula	74	−4	Southern Slope	43	−13
East Gulf	66	−8	Southern Plateau	36	−4
West Gulf	66	−4	Middle Plateau	57	+3
Ohio Valley and Tennessee	70	0	Northern Plateau	70	0
Lower Lake	77	+1	North Pacific Coast	79	−1
Upper Lake	83	+5	Middle Pacific Coast	66	−10
North Dakota	79	+2	South Pacific Coast	67	−7
Upper Mississippi	74	+3			

SUNSHINE AND CLOUDINESS.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the table below:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	6.7	+1.1	Missouri Valley	5.7	+0.1
Middle Atlantic	5.9	+0.4	Northern Slope	5.2	−0.1
South Atlantic	4.5	−0.2	Middle Slope	4.5	+0.1
Florida Peninsula	3.6	−0.4	Southern Slope	3.6	−0.6
East Gulf	4.3	−0.4	Southern Plateau	2.4	−0.6
West Gulf	3.7	−1.5	Middle Plateau	4.8	−0.1
Ohio Valley and Tennessee	6.2	+0.3	Northern Plateau	5.8	−0.7
Lower Lake	7.3	+0.9	North Pacific Coast	7.1	+0.5
Upper Lake	7.2	+1.3	Middle Pacific Coast	3.7	−1.3
North Dakota	5.0	−0.5	South Pacific Coast	2.9	−1.6
Upper Mississippi	6.5	+1.0			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 1,597 thunderstorms were received during the current month as against 740 in 1900 and 357 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country were most numerous were: 25th, 243; 26th, 177; 10th, 169.

Reports were most numerous from: Missouri, 117; Illinois, 106; North Carolina and Ohio, 91.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz: 1st to 9th.

In Canada.—Auroras were reported as follows: Halifax, 24th; Quebec, 18th, 24th; Minnedosa, 22d, 23d, 24th; Battleford, 13th, 21st.

Thunderstorms were reported as follows: Kingston, 10th, 25th; White River, 26th; Parry Sound, 10th, 25th; New Westminster, 25th.

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Alpena, Mich	3	54	se.	Jacksonville, Fla	26	61	s.
Amarillo, Tex	9	55	nw.	Lexington, Ky	3	52	sw.
Do	12	52	nw.	Marquette, Mich	3	62	w.
Do	18	50	nw.	Memphis, Tenn	9	75	sw.
Do	19	50	nw.	Mount Tamalpais, Cal.	7	75	nw.
Do	23	50	nw.	Do	8	62	nw.
Do	27	50	nw.	Do	10	55	w.
Buffalo, N. Y	3	52	sw.	Do	17	62	nw.
Do	4	53	s.	Do	21	81	nw.
Do	11	60	w.	Do	22	82	nw.
Chicago, Ill	13	56	se.	Do	23	60	w.
Do	20	50	sw.	Do	24	55	n.
Cleveland, Ohio	3	53	sw.	Do	27	56	nw.
Denver, Colo	2	55	nw.	Nashville, Tenn	23	58	se.
Do	3	61	nw.	New York, N. Y	31	62	nw.
Eastport, Me	11	50	se.	North Platte, Nebr	12	53	nw.
El Paso, Tex	8	58	w.	Pensacola, Fla	23	54	se.
Do	18	54	nw.	Point Reyes Light, Cal.	8	66	nw.
Do	23	52	w.	Portland, Me	11	50	ne.
Do	24	55	nw.	Saint Louis, Mo	10	53	sw.
Erie, Pa	3	52	s.	Do	13	50	w.
Do	10	50	s.	Sault Ste. Marie, Mich.	3	54	w.
Fort Smith, Ark	12	50	w.	Sioux City, Iowa	3	58	nw.
Hatteras, N. C	5	52	n.	Winnemucca, Nev	10	53	sw.

DESCRIPTION OF TABLES AND CHARTS.

By ALFRED J. HENRY, Professor of Meteorology.

Table I gives, for about 145 Weather Bureau stations making two observations daily and for about 25 others making only one observation, the data ordinarily needed for climatological studies, viz, the monthly mean pressure, the monthly means and extremes of temperature, the average conditions as to moisture, cloudiness, movement of the wind, and the departures from normals in the case of pressure, temperature, and precipitation, the total depth of snowfall, and the mean wet-bulb temperatures. The altitudes of the instruments above ground are also given.

Table II gives, for about 2,700 stations occupied by voluntary observers, the highest maximum and the lowest minimum temperatures, the mean temperature deduced from the average of all the daily maxima and minima, or other readings, as indicated by the numeral following the name of the station; the total monthly precipitation, and the total depth in inches of

any snow that may have fallen. When the spaces in the snow column are left blank it indicates that no snow has fallen, but when it is possible that there may have been snow of which no record has been made, that fact is indicated by leaders, thus (. . . .).

Table III gives, for all stations that make observations at 8 a. m. and 8 p. m., the four component directions and the resultant directions based on these two observations only and without considering the velocity of the wind The total movement for the whole month, as read from the dial of the Robinson anemometer, is given for each station in Table I. By adding the four components for the stations comprised in any geographical division the average resultant direction for that division can be obtained.

Table IV gives the total number of stations in each State from which meteorological reports of any kind have been received, and the number of such stations reporting thunderstorms (T) and auroras (A) on each day of the current month.

Table V gives a record of rains whose intensity at some period of the storm's continuance equaled or exceeded the following rates:

Duration, minutes..	5	10	15	20	25	30	35	40	45	50	60	80	100	120
Rates pr. hr. (ins.)..	3.00	1.80	1.40	1.20	1.08	1.00	0.94	0.90	0.86	0.84	0.75	0.60	0.54	0.50

In the northern part of the United States, especially in the colder months of the year, rains of the intensities shown in the above table seldom occur. In all cases where no storm of sufficient intensity to entitle it to a place in the full table has occurred, the greatest rainfall of any single storm has been given, also the greatest hourly fall during that storm.

Table VI gives, for about 30 stations furnished by the Canadian Meteorological Service, Prof. R. F. Stupart, director, the means of pressure and temperature, total precipitation and depth of snowfall, and the respective departures from normal values, except in the case of snowfall.

Table VII gives the heights of rivers referred to zeros of gages.

NOTES EXPLANATORY OF THE CHARTS.

Chart I, tracks of centers of high areas, and Chart II, tracks of centers of low areas, are constructed in the same way. The roman numerals show number and chronological order of highs (Chart I) and lows (Chart II). The figures within the circles show the days of the month; the letters *a* and *p* indicate, respectively, the 8 a. m. and 8 p. m., seventy-fifth meridian time, observations. Within each circle is also given (Chart I) the highest barometric reading and (Chart II) the lowest pressure at or near the center at that time.

Chart III.—Total precipitation. The scale of shades showing the depth of rainfall is given on the chart itself. For isolated stations the rainfall is given in inches and tenths, when appreciable; otherwise, a "trace" is indicated by a capital T, and no rain at all, by 0.0.

Chart IV.—Sea-level pressure, temperature, and resultant surface winds. The wind directions on this Chart are the computed resultants of observations at 8 a. m. and 8 p. m., daily; the resultant duration is shown by figures attached to each arrow. The temperatures are the means of daily maxima and minima and are reduced to sea level. The pressures are the means of 8 a. m. and 8 p. m. observations, daily, and are reduced to sea level and to standard gravity. The reduction for 30 inches of the mercurial barometer, as formerly shown by the marginal figures for each degree of latitude, has already been applied.

Chart V.—Hydrographs for seven principal rivers of the United States.

Chart VI.—Surface temperatures; maximum, minimum, and mean. Lines of equal monthly mean temperature in red; lines of equal maximum temperature in black; and lines of equal minimum temperature (dotted) also in black.

Chart VII.—Percentage of sunshine. The average cloudiness at each Weather Bureau station is determined by numerous personal observations during the day. The difference between the observed cloudiness and 100, it is assumed, represents the percentage of sunshine, and the values thus obtained have been used in preparing Chart VII.

Chart VIII.—West Indian monthly isobars, isotherms, and resultant winds.

Chart IX.—Total snowfall.

TABLE I.—*Climatological data for Weather Bureau Stations, March, 1901.*

Stations.	Elevation of instruments. Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches. Mean actual, 8 a. m. + 8 p. m. ÷ 2.	Mean reduced.	Departure from normal.	Temperature of the air, in degrees Fahrenheit. Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches. Total.	Departure from normal.	Days with .01, or more.	Wind. Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
New England.							33.3	+ 1.1										76	5.55	+ 1.7										6.7	
Eastport	76	69	74	29.79	29.88	.00	29.8	+ 1.1	48	21	36	7	1	24	28	28	25	81	4.88	+ 0.5	19	9,609	n.	50	se.	11	12	4	15	6.3	11.9
Portland, Me	103	81	117	29.76	29.87	— .05	31.8	— 0.2	48	27	39	3	7	25	27	28	23	73	6.42	+ 3.1	14	7,935	nw.	50	ne.	11	8	9	14	6.4	10.7
Northfield	876	15	65	28.93	29.92	— .06	25.4	+ 0.4	47	25	34	—12	3	17	44	23	18	74	3.31	+ 0.9	16	7,933	s.	48	s.	3	1	7	23	8.3	8.0
Boston	125	115	181	29.77	29.91	— .03	36.2	+ 2.0	58	21	43	9	7	30	23	32	26	70	6.58	+ 2.5	14	9,792	w.	36	s.	21	5	12	14	6.7	T.
Nantucket	12	43	85	29.91	29.92	— .03	36.4	+ 1.5	56	27	42	13	7	31	20	33	30	78	4.74	+ 1.2	17	13,023	sw.	46	se.	11	5	5	21	7.6	0.8
Block Island	26	11	70	29.80	29.92	— .03	35.6	+ 0.8	52	26	41	13	7	30	19	33	29	80	5.60	+ 1.6	10	14,765	w.	49	nw.	5	9	9	13	5.8	0.5
Narragansett	......	10	......	......	......	......	34.8	+ 1.5	54	27	42	8	7	27	27	......	......	......	7.03	+ 2.4	12	......	nw.	......	......	......	16	2	13	......	T.
New Haven	106	117	140	29.80	29.92	— .06	36.0	+ 1.4	52	27	43	9	7	29	27	32	28	74	5.80	+ 1.6	14	8,159	nw.	32	nw.	29	10	7	14	5.8	0.5
Mid. Atlan. States.							42.0	+ 2.3										71	3.63	— 0.2										5.9	
Albany	97	84	113	29.81	29.92	— .06	32.8	+ 0.9	52	18	40	6	7	25	30	30	25	76	4.14	+ 1.5	13	7,067	s.	46	se.	3	5	9	17	7.2	4.5
Binghamton	875	79	90	......	......	......	32.2	+ 1.4	57	23	40	0	6	24	37	......	......	......	2.95	— 0.2	17	6,385	nw.	34	se.	11	5	6	20	7.3	4.6
New York	314	108	350	29.57	29.92	— .07	38.6	+ 1.7	53	19	45	12	6	32	21	34	28	67	5.18	+ 1.2	14	13,506	nw.	62	nw.	31	7	9	15	6.4	T.
Harrisburg	374	94	104	......	......	......	40.0	+ 3.8	71	19	48	7	6	32	34	......	......	......	3.60	+ 0.1	13	7,250	nw.	36	nw	12	6	11	14	6.7	2.2
Philadelphia	117	168	184	29.81	29.94	— .07	41.8	+ 2.7	66	19	50	13	6	33	30	36	31	70	3.39	+ 0.1	14	9,699	nw.	36	s.	11	6	8	17	6.7	0.1
Scranton	805	111	119	29.04	29.95	— .05	35.6	......	50	23	44	4	6	27	33	32	28	79	3.23	......	14	6,875	sw.	36	se.	11	7	11	13	6.5	4.3
Atlantic City	52	68	76	29.88	29.91	— .04	40.2	+ 2.6	60	19	47	12	6	33	27	37	33	80	3.31	— 0.6	14	9,570	nw.	38	nw.	31	6	12	13	6.0	2.3
Cape May	17	47	51	29.94	29.96	— .03	40.6	+ 1.1	69	19	46	16	6	35	30	37	......	......	3.45	— 0.9	13	7,471	w.	38	se.	11	9	11	11	5.8	0.5
Baltimore	123	68	82	29.80	29.93	— .08	43.8	+ 2.3	74	19	52	13	6	36	34	38	34	75	3.58	— 0.5	12	5,005	w.	25	e.	10	11	11	9	5.1	0.1
Washington	112	59	76	29.82	29.94	— .08	45.0	+ 3.7	75	19	55	11	6	35	40	39	32	66	2.64	— 1.5	9	6,958	nw.	31	nw.	26	7	11	13	6.1	0.1
Cape Henry	......	5	33	......	......	......	49.5	+ 4.3	76	19	59	17	7	40	29	......	......	......	4.39	— 0.7	10	9,840	s.	48	n.	5	7	12	12	6.1	0.5
Lynchburg	681	83	88	29.20	29.94	— .09	47.6	+ 2.4	72	18	58	14	6	37	42	41	33	61	3.66	0.0	8	4,609	nw.	34	nw.	11	12	11	8	4.9	T.
Norfolk	91	102	111	29.87	29.97	— .05	51.3	+ 4.4	72	19	60	18	7	42	32	45	39	68	3.24	— 1.4	13	8,454	s.	36	s.	20	9	11	11	5.4	0.7
Richmond	144	82	90	......	......	......	49.6	......	72	19	60	15	7	40	38	......	......	......	3.79	......	10	5,356	sw.	33	sw.	11	8	12	11	5.6	1.4
S. Atlantic States.							54.6	+ 0.9										69	4.24	— 0.2										4.5	
Charlotte	773	68	76	29.15	29.98	— .04	50.8	+ 0.9	75	26	61	16	7	40	39	43	35	60	5.48	+ 0.7	8	7,188	s.	34	sw.	26	14	6	11	5.1	
Hatteras	11	17	36	29.99	30.00	— .01	53.4	+ 3.3	71	25	59	26	6	48	23	50	47	80	3.81	— 2.3	7	11,692	sw.	52	n.	5	14	10	7	4.4	
Kittyhawk	8	12	30	......	......	......	51.0	+ 3.6	70	19	58	24	6	45	26	......	......	......	4.74	— 0.4	6	11,074	w.	......	......	......	16	8	7	4.5	
Raleigh	376	93	101	29.60	30.00	— .02	52.0	+ 3.8	76	24	63	16	7	41	37	44	37	62	2.96	— 1.1	9	6,066	sw.	30	sw.	11	14	8	9	4.6	
Wilmington	78	82	90	29.93	30.02	.00	54.8	+ 0.9	77	25	64	21	7	45	32	48	44	74	3.98	0.0	8	7,897	sw.	40	w.	11	14	10	7	4.4	
Charleston	48	14	92	30.00	30.05	+ .01	56.6	— 0.1	79	31	64	29	7	49	25	49	44	71	2.40	— 1.5	12	8,033	s.	35	s.	26	13	12	6	4.4	
Columbia	......	5	......	......	......	......	54.0	— 0.2	81	25	67	20	7	41	47	......	......	......	4.50	0.0	12	......	sw.	......	......	......	11	11	9	5.0	
Augusta	180	89	103	29.82	30.01	— .02	54.6	— 0.9	80	25	65	23	7	44	34	47	40	64	5.60	+ 0.4	9	6,291	w.	32	w.	5	13	9	9	4.6	
Savannah	65	79	89	29.97	30.04	— .03	58.0	— 0.5	81	26	67	28	6	49	27	50	45	70	2.34	— 1.4	9	7,153	sw	38	se.	23	13	14	4	4.3	
Jacksonville	43	69	84	30.01	30.06	+ .01	60.4	— 1.6	82	25	70	30	7	51	28	53	48	72	6.57	+ 3.1	9	6,939	w.	61	s	26	16	5	10	4.1	
Florida Peninsula.							67.0	— 1.6										74	2.85	+ 0.7										3.6	
Jupiter	28	13	55	30.03	30.06	+ .01	67.7	— 0.1	89	31	75	41	17	60	26	61	57	74	2.30	+ 0.1	8	9,004	se.	36	s.	2	13	16	2	3.9	
Key West	22	43	50	30.04	30.06	+ .01	70.2	— 2.5	84	31	75	52	7	65	18	64	61	76	2.68	+ 1.5	5	8,574	se.	48	nw.	20	21	9	1	3.0	
Tampa	34	60	67	30.03	30.07	+ .01	63.2	— 2.3	82	31	72	34	7	54	30	56	51	72	3.58	+ 0.6	8	5,939	w.	30	s.	10	17	5	9	3.9	
East Gulf States.							57.4	— 1.0										66	5.53	— 0.4										4.3	
Atlanta	1,174	139	156	28.76	30.01	— .06	51.6	+ 0.1	75	3	61	17	6	42	37	44	38	65	5.71	— 0.1	11	9,764	sw.	40	nw.	5	11	11	9	5.0	T.
Macon	370	93	99	......	......	......	54.6	......	80	25	65	20	7	44	36	......	......	......	6.94	......	10	6,363	nw.	35	nw.	25	14	3	14	5.1	T.
Pensacola	56	78	90	......	......	......	59.0	— 0.5	75	28	65	32	6	53	23	......	......	......	6.77	+ 1.3	9	9,205	nw.	54	se.	23	14	6	11	4.7	
Mobile	57	88	96	29.96	30.03	— .02	58.0	— 0.9	79	28	65	31	6	51	27	52	46	70	8.84	+ 1.3	12	7,508	s.	32	se.	10	14	7	10	4.5	
Montgomery	223	100	112	29.77	30.01	— .05	56.4	— 0.6	79	10	66	25	7	46	34	48	42	65	5.80	— 0.7	7	7,059	s.	35	w.	10	16	5	10	4.2	
Meridian	375	84	93	......	......	......	55.6	— 1.8	80	25	67	23	7	44	41	......	......	......	4.39	— 1.9	8	6,499	sw.	40	e.	23	18	8	5	3.4	
Vicksburg	247	65	76	29.69	29.96	— .09	57.0	— 1.0	82	29	67	26	6	47	31	48	39	59	3.12	— 3.3	8	8,081	s.	36	s.	9	13	11	7	3.9	
New Orleans	51	88	121	29.95	30.01	— .02	61.3	— 0.7	81	28	70	35	6	53	26	54	48	69	4.26	— 1.0	7	8,255	s.	39	s.	9	17	10	4	3.3	
Port Eads	......	27	......	......	......	......	60.0	— 2.2	75	13	67	35	7	53	27	......	......	......	5.35	+ 1.6	11	......	sw.	......	......	......	8	11	12	......	
West Gulf States.							58.3	+ 0.5										66	2.23	— 1.2										3.7	
Shreveport	249	77	84	29.69	29.96	— .07	57.1	— 0.5	83	4	68	26	6	46	35	47	39	58	2.25	— 2.4	6	7,777	s.	38	se.	19	20	2	9	3.4	
Fort Smith	457	79	94	29.43	29.93	— .09	50.6	+ 0.6	84	2	61	18	6	40	42	44	39	70	3.44	+ 0.2	6	9,440	nw.	50	w.	12	9	14	8	4.5	
Little Rock	357	93	100	29.56	29.95	— .10	51.8	— 0.4	81	2	62	20	6	42	35	45	39	68	4.43	— 0.8	10	8,824	nw.	38	nw.	5	17	6	8	4.1	
Corpus Christi	18	42	50	29.93	29.95	— .06	66.1	+ 3.3	96	9	74	42	6	58	34	58	51	73	0.07	— 1.6	2	10,688	se.	36	se.	18	21	4	6	2.9	
Fort Worth	670	106	114	29.22	29.94	— .08	56.7	......	90	2	70	24	6	43	41	45	33	48	1.57	......	7	11,689	sw.	48	sw.	8	17	12	2	3.0	
Galveston	54	106	112	29.90	29.95	— .06	61.4	— 1.1	77	30	67	39	6	56	18	58	56	84	1.96	— 1.0	6	10,734	se.	48	n.	5	14	6	11	5.0	
Palestine	510	73	79	29.42	29.97	— .06	58.3	+ 0.7	87	4	69	28	6	48	32	52	49	79	2.91	— 1.1	6	8,277	s.	42	w.	10	19	5	7	3.4	
San Antonio	701	67	77	29.21	29.96	— .05	62.8	+ 0.9	95	4	76	31	6	49	43	50	39	52	0.54	— 1.5	5	7,521	se.	48	nw.	9	18	7	6	3.4	
Ohio Val. & Tenn.							45.4	+ 1.3										70	3.43	— 0.8										6.2	
Chattanooga	762	106	112	29.19	30.01	— .04	49.8	— 0.7	76	3	59	13	6	40	38	43	35	63	8.46	+ 2.5	11	7,922	se.	40	s.	9	11	10	10	5.2	T.
Knoxville	1,004	10	88	28.91	30.00	— .06	47.6	0.0	77	24	58	12	6	38	39	41	34	66	4.32	— 1.0	12	8,509	sw.	46	sw.	3	11	9	11	5.3	T.
Memphis	397	140	154	29.54	29.97	— .07	51.7	+ 0.1	78	24	60	21	6	43	35	46	42	74	3.48	— 2.4	9	11,629	s.	75	sw.	9	13	9	9	4.6	T.
Nashville	546	128	134	29.38	29.98	— .06	49.9	+ 1.2	80	8	60	14	6	40	36	41	31	58	2.39	— 2.8	12	8,291	s.	58	se.	23	12	8	11	5.2	0.3
Lexington	989	75	102	......	......	......	43.8	+ 1.9	76	3	53	4	6	34	35	......	......	......	2.23	— 2.7	11	11,402	s.	52	sw.	3	9	10	12	6.0	0.3
Louisville	525	114	136	29.34	29.93	— .12	46.8	+ 2.4	79	24	56	9	6	38	35	40	33	67	3.59	— 0.4	11	9,224	sw.	45	sw.	3	10	4	17	6.3	0.5
Evansville	434	72	82	......	......	......	45.4	......	76	24	54	12	5	37	53	......	......	......	3.46	......	13	8,048	s.	37	s.	10	12	5	14	5.1	T.
Indianapolis	822	154	164	28.99	29.90	— .12	39.8	+ 0.3	70	25	48	4	6	32	36	35	31	75	4.11	+ 0.5	19	11,126	sw.	48	s.	23	5	7	19	7.5	1.3
Cincinnati	628	152	157	29.23	29.93	— .11	43.3	+ 1.1	74	24	52	5	6	34	37	39	35	75	2.01	— 1.3	13	8,065	sw.	48	sw.	3	6	3	22	7.4	0.8
Columbus	824	87	100	29.01	29.92	— .11	40.6	+ 2.5	74	24	50	2	6	32	30	35	30	72	1.82	— 1.2	17	7,988	sw.	42	sw.	3	4	8	19	7.5	2.2
Pittsburg	842	116	123	28.98	29.91	— .12	41.6	+ 2.9	76	25	51	2	6	32	37	36	30	68	3.69	+ 1.0	18	5,839	nw.	26	nw.	3	10	9	12	6.0	5.8
Parkersburg	638	77	84	29.26	29.96	— .08	44.2	+ 2.8	78	3	54	4	6	35	44	38	33	73	2.21	— 1.1	17	6,304	w.	36	nw.	3	8	8	15	6.7	1.2
Elkins	1,940	41	50	27.85	29.95	— .08	39.0	......	72	24	50	0	6	28	42	35	30	75	3.50	......	21	5,482	w.	36	s.	20	1	12	18	7.3	4.5
Lower Lake Region.							33.9	+ 1.6										77	2.65	+ 0.1										7.3	
Buffalo	767	178	206	29.03	29.90	— .10	32.6	+ 2.6	62	25	40	1	6	25	34	29	25	76	3.03	+ 0.5	22	13,500	w.	60	w.	11	4	7	20	7.9	10.5
Oswego	335	76	87	29.51	29.90	— .10	30.2	— 0.2	52	25	37	0	3	23	40	28	24	80	3.66	+ 1.0	18	10,906	se.	48	s.	3	3	3	25	8.2	14.5
Rochester	523	81	90	29.30	29.89	— .11	31.6	+ 1.3	61	25	39	— 1	6	24	31	29	25	77	3.75	+ 0.9	22	7,334	sw.	30	sw.	11	6	7	18	7.2	13.7
Erie	713	92	102	29.10	29.89	— .11	34.1	+ 1.7	66	25	42	— 1	6	26	34	31	29	84	1.99	— 0.8	17	10,797	w.	52	s.	3	6	5	20	7.0	5.7
Cleveland	762	190	201	29.04	29.89	— .14	36.6	+ 3.1	70	25	45	0	6	29	30	32	27	71	2.93	+ 0.2	19	13,132	se.	53	sw.	3	7	8	16	6.5	5.3
Sandusky	629	62	70	29.18	29.88	— .15	36.8	+ 2.1	71	18	45	2	6	29	39	32	28	75	2.07	— 0.5	16	7,634	sw.	37	nw.	3	5	4	22	7.9	1.3
Toledo	628	123	127	29.18	29.89	— .12	36.0	+ 1.4	70	25	44	2	6	28	35	31	27	75	1.94	— 0.1	15	9,542	sw.	42	w.	3	8	7	16	6.8	2.9
Detroit	730	160	190	29.05	29.87	— .14	33.2	+ 0.7	66	25	41	2	6	26	38	30	26	79	1.80	— 0.5	13	11,155	sw.	48	sw.	3	6	6	19	7.0	4.5
Upper Lake Region.							27.4	+ 0.8										83	2.82	+ 0.8										7.2	
Alpena	609	63	80	29.19	29.88	— .14	25.5	+ 1.5	44	26	33	— 5	6	18	35	24	21	82	3.25	+ 1.3	11	10,579	e.	54	se.	3	6	4	21	7.5	15.7
Escanaba	612	43	57	29.19	29.89	— .14	23.0	+ 1.2	44	1	31	— 9	6	15	31	21	19	88	3.35	+ 1.6	13	8,380	n.	38	w.	3	5	7	19	7.3	24.1
Grand Haven	632	55	92	29.13	29.84	— .17	31.2	+ 0.6	59	25	37	4	5	25	29	29	27	86	3.71	+ 1.4	16	10,960	sw.	49	sw.	3	5	8	18	7.3	6.0
Houghton	668	66	74	......	......	......	22.6	......	43	1	30	— 9	5	15	34	......	......	......	3.10	......	16	6,782	ne.	44	w.	3	5	10	16	6.9	24.5
Marquette	734	79	116	29.08	29.91	— .13	23.6	+ 0.4	42	1	29	— 8	5	19	28	22	21	88	2.72	+ 0.9	17	9,207	ne.	62	w.	3	4	8	19	7.3	28.0
Port Huron	638	70	120	29.18	29.90	— .11	31.2	+ 2.1	64	25	39	— 3	6	23	38	28	25	81	1.37	— 1.2	12	10,630	sw.	47	w.	3	7	5	19	7.0	3.5
Sault Ste. Marie	614	40	61	29.17	29.87	— .15	21.4	— 0.5	44	24	30	—18	6	12	34	19	16	78	2.11	+ 0.9	13	8,529	e.	54	w.	3	8	8	15	6.4	14.0
Chicago	823	241	274	28.94	29.86	— .17	34.0	— 0.1	68	18	41	1	5	28	33	32	29	86	3.38	+ 0.9	18	15,318	sw.	56	se.	13	6	8	17	7.0	5.9
Milwaukee	681	124	142	29.09	29.86	— .16	32.4	+ 1.9	53	18	39	0	5	26	28	29	26	84	3.62	+ 1.2	16	9,747	w.	43	ne.	10	3	4	24	8.2	8.9
Green Bay	617	49	57	29.18	29.89	— .15	26.9	+ 0.2	46	31	34	— 4	5	20	27	24	20	73	2.75	+ 0.6	15	7,954	n.	43	sw.	3	5	9	17	7.5	13.8
Duluth	702	95	115	29.13	29.93	— .12	24.8	+ 0.8	52	16	31	—15	5	18	32	22	19	81	1.95	+ 0.3	12	10,531	ne.	42	nw.	3	8	9	14	6.4	19.3
North Dakota.							28.5	+ 6.4										79	1.26	+ 0.5										5.0	
Moorhead	935	54	60	28.92	29.99	— .11	27.4	+ 7.2	50	17	35	— 9	5	20	27	25	24	90	2.56	+ 1.7	11	8,251	nw.	39	nw.	3	10	8	13	5.9	11.2
Bismarck	1,674	16	29	28.17	30.08	— .07	27.8	+ 5.2	63	16	38	— 9	4	18	43	23	17	65	0.96	— 0.1	6	8,084	nw.	44	nw.	4	18	4	9	4.7	6.2
Williston	1,875	15	31	27.95	30.02	— .06	30.2	+ 6.7	60	16	40	— 7	4	20	38	27	24	82	0.26	— 0.2	7	7,424	n.	48	nw.	4	19	8	4	4.5	2.4

TABLE I.—*Climatological data for Weather Bureau Stations, March, 1901*—Continued.

Stations.	Elevation of instruments: Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Pressure, in inches: Mean actual, 8 a. m. + 8 p. m. ÷ 2.	Mean reduced.	Departure from normal.	Temperature of the air, in degrees Fahrenheit: Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches: Total.	Departure from normal.	Days with .01, or more.	Wind: Total movement, miles.	Prevailing direction.	Maximum velocity: Miles per hour.	Direction.	Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
Upper Mis. Valley.							36.3	+ 1.0										74	2.72	+ 0.5										6.5	
Minneapolis	......	99	208	......	......	......	29.0	+ 1.6	55	17	36	− 8	5	22	28	....	....	....	1.84	+ 0.3	12	10,423	n.	45	nw.	3	4	8	19	....	19.1
St. Paul	837	114	124	28.95	29.90	− .16	29.8	+ 2.3	52	23	36	− 7	5	23	26	27	24	81	2.52	+ 1.1	14	7,320	nw.	38	nw.	3	7	9	15	6.5	19.1
La Crosse	714	70	78	......	......	......	31.0	+ 0.2	54	17	38	− 5	5	24	32	....	....	....	2.16	+ 0.6	14	6,493	n.	44	w.	3	7	6	18	6.8	16.7
Davenport	606	71	79	29.16	29.84	− .21	35.8	+ 0.9	67	18	43	4	5	28	27	32	28	77	2.57	+ 0.4	11	7,653	w.	35	ne.	10	7	8	16	6.6	3.4
Des Moines	861	84	88	28.93	29.90	− .15	35.8	+ 1.1	66	18	44	4	5	27	36	32	28	78	3.02	+ 1.6	11	7,561	nw.	29	nw.	5	7	12	12	6.2	16.6
Dubuque	698	101	109	29.07	29.86	− .17	32.8	− 0.1	65	18	40	− 2	5	26	30	30	26	78	2.88	+ 0.6	12	7,176	nw.	36	nw.	5	8	8	15	6.1	12.0
Keokuk	614	63	78	29.17	29.86	− .17	38.6	+ 1.0	70	18	46	10	6	32	30	34	30	75	2.59	+ 0.4	12	8,324	sw.	38	sw.	13	6	10	15	6.4	1.1
Cairo	356	87	93	29.54	29.94	− .08	46.8	0.0	75	24	55	15	6	39	29	40	34	65	3.62	− 0.1	14	10,052	sw.	45	w.	13	9	9	13	6.1	0.3
Springfield, Ill	644	82	93	29.16	29.87	− .17	39.8	+ 0.6	70	18	47	7	5	33	27	35	30	73	2.96	+ 0.3	12	9,842	nw.	36	w.	13	5	10	16	7.1	0.8
Hannibal	534	75	110	......	......	......	40.8	+ 1.3	72	18	49	12	5	32	33	....	....	....	2.78	+ 0.4	11	9,713	sw.	49	w.	13	7	9	15	6.5	0.5
St. Louis	567	111	210	29.26	29.89	− .15	44.8	+ 1.7	71	18	52	15	6	37	30	39	33	68	2.94	− 0.6	9	10,379	s.	53	sw.	10	8	6	17	6.4	2.1
Missouri Valley.							37.8	+ 2.4										68	2.07	+ 0.3										5.7	
Columbia	784	4	84	......	......	......	41.7	+ 0.3	74	17	52	14	6	32	42	....	....	....	3.25	+ 0.3	9	9,618	sw.	43	w.	13	6	8	17	7.1	0.8
Kansas City	963	78	95	28.85	29.91	− .14	42.2	+ 1.7	80	2	52	14	6	33	42	37	31	71	3.69	+ 1.5	8	8,824	nw.	40	sw.	12	9	10	12	6.0	9.3
Springfield, Mo	1,324	100	103	28.48	29.92	− .11	43.7	+ 0.2	78	2	53	11	6	34	31	38	33	72	4.43	+ 1.1	6	11,200	nw.	44	w.	12	13	9	9	4.5	2.5
Topeka	......	81	....	......	......	......	42.2	+ 1.2	83	2	53	13	6	31	44	....	....	....	1.78	− 0.2	6	......	n.	....	......	...	5	17	9	5.6	4.0
Lincoln	1,189	75	84	28.58	29.89	− .17	37.6	− 0.3	79	17	48	10	5	28	47	32	25	68	1.73	+ 0.4	8	11,530	nw.	48	nw.	12	11	7	13	6.0	13.9
Omaha	1,105	115	121	28.66	29.88	− .18	36.9	+ 1.4	75	17	46	6	5	28	39	32	28	75	2.07	+ 0.6	10	9,271	nw.	40	n.	19	8	10	13	6.5	15.6
Valentine	2,598	39	40	27.16	29.98	− .11	33.5	+ 2.3	72	22	46	1	5	21	47	27	20	66	1.70	+ 0.2	8	9,893	nw.	47	nw.	3	10	13	8	5.3	14.9
Sioux City	1,135	96	164	......	......	......	35.0	+ 3.4	70	1	44	4	5	26	37	....	....	....	1.58	+ 0.2	12	11,219	nw.	58	nw.	3	7	11	13	6.3	9.8
Pierre	1,572	43	50	28.25	29.98	− .11	34.4	+ 5.0	73	17	46	4	5	23	51	28	18	55	1.09	+ 0.2	8	7,779	n.	41	nw.	3	11	6	14	5.9	5.8
Huron	1,306	56	67	28.51	29.97	− .13	32.4	+ 4.8	73	17	44	− 1	5	20	52	26	20	67	0.79	− 0.1	8	10,458	nw.	48	nw.	3	12	11	8	5.2	3.9
Yankton	1,233	52	58	......	......	......	36.0	+ 6.0	79	17	47	1	5	25	48	....	....	....	0.64	− 0.5	5	9,059	n.	42	n.	19	16	7	8	4.6	5.0
Northern Slope.							34.6	+ 2.8										68	0.80	0.0										5.2	
Havre	2,505	46	47	27.27	29.98	− .07	35.2	+ 6.2	63	16	46	− 2	4	24	39	31	27	75	0.10	− 0.4	5	7,509	sw.	38	nw.	17	9	16	6	5.0	0.9
Miles City	2,371	42	50	27.40	29.98	− .10	35.6	+ 4.2	72	17	48	2	4	24	42	31	28	87	0.60	+ 0.1	7	5,241	nw.	48	nw.	2	15	12	4	4.0	3.4
Helena	4,110	88	93	25.74	30.04	− .02	35.4	+ 2.8	61	1	43	1	5	27	31	29	21	59	1.05	+ 0.5	4	6,778	sw.	42	sw.	2	2	11	18	6.9	12.0
Kalispell	2,965	45	51	26.89	30.05	+ .01	35.4	......	58	21	43	8	4	28	30	31	26	72	0.98	......	16	4,424	se.	40	sw.	3	9	13	9	5.4	2.0
Rapid City	3,234	46	50	26.50	29.95	− .13	33.8	+ 2.6	68	17	45	1	5	22	44	28	20	62	0.40	− 0.7	4	7,313	nw.	40	nw.	2	13	13	5	4.5	3.4
Cheyenne	6,088	56	64	23.86	30.07	+ .01	31.8	− 1.0	62	2	42	3	30	21	36	25	17	59	1.54	+ 0.8	11	10,822	nw.	49	nw.	2	13	8	10	5.1	13.8
Lander	5,372	28	36	24.54	30.05	− .03	34.0	+ 3.5	64	1	46	9	5	22	42	27	20	63	0.38	− 1.0	7	4,450	sw.	36	w.	2	7	16	8	5.5	3.8
North Platte	2,821	43	52	26.96	30.00	− .07	36.4	+ 1.3	76	2	49	6	31	24	46	30	23	68	1.53	+ 0.8	9	9,522	nw.	53	nw.	12	10	11	10	5.5	17.0
Middle Slope.							42.0	0.0										58	1.00	− 0.6										4.5	
Denver	5,291	79	151	24.60	30.04	.00	38.0	− 0.8	72	2	50	10	5	26	45	29	18	52	0.88	− 0.1	7	7,653	sw.	61	nw.	3	11	10	10	5.2	15.7
Pueblo	4,685	80	86	25.17	29.98	− .04	39.4	− 1.0	77	2	54	9	6	25	57	30	18	49	1.15	+ 0.6	6	6,575	nw.	44	nw.	12	12	14	5	4.4	9.7
Concordia	1,398	42	47	28.38	29.92	− .13	39.7	+ 0.7	78	17	50	13	5	29	47	34	30	75	1.29	− 0.5	8	7,751	nw.	36	nw.	3	10	10	11	5.0	8.7
Dodge	2,509	44	52	27.28	29.96	− .05	42.0	+ 0.4	85	2	56	14	6	28	49	33	25	64	0.80	− 0.2	8	10,298	nw.	52	nw.	3	19	7	5	4.8	5.5
Wichita	1,358	78	85	28.47	29.94	− .08	44.4	+ 0.9	83	17	56	13	6	33	47	35	27	58	1.52	− 0.4	6	10,185	n.	43	w.	12	14	10	7	4.2	2.3
Oklahoma	1,214	54	62	28.62	29.91	− .08	48.8	− 0.3	84	2	62	14	6	35	47	39	28	52	0.35	− 2.7	7	10,811	s.	43	s.	7	18	6	7	3.9	T.
Southern Slope.							50.4	+ 0.9										43	0.37	− 0.4										3.6	
Abilene	1,738	45	54	28.11	29.95	− .07	55.8	+ 1.7	88	2	69	23	6	42	41	43	30	43	0.72	− 0.4	3	9,488	nw.	42	w.	9	16	11	4	3.9	
Amarillo	3,676	54	61	26.14	29.96	− .05	45.0	+ 0.1	82	2	58	18	6	31	45	34	19	43	0.02	− 0.5	1	13,770	sw.	55	nw.	9	19	8	4	3.4	0.1
Southern Plateau.							50.2	− 1.0										36	0.50	− 0.4										2.4	
El Paso	3,762	10	110	26.11	29.95	.00	54.4	− 1.4	84	2	69	30	20	40	45	39	17	29	0.47	+ 0.1	3	11,377	nw.	58	w.	8	18	12	1	2.6	
Santa Fe	7,013	47	50	23.13	29.99	.00	37.9	− 1.6	65	2	49	16	24	27	35	28	18	49	0.89	+ 0.2	5	6,481	nw.	35	nw.	12	19	9	3	3.1	7.4
Flagstaff	6,907	12	25	23.26	30.11	......	34.7	− 2.5	63	1	48	5	31	22	39	30	....	....	0.94	− 2.2	6	......	w.	....	......	...	13	6	12	....	8.1
Phoenix	1,108	47	57	28.76	29.94	− .01	59.9	− 1.6	87	1	74	35	25	46	36	46	30	38	0.33	− 0.4	3	3,754	e.	22	n.	24	21	5	5	2.6	
Yuma	141	16	50	29.77	29.92	− .04	64.6	+ 0.6	89	1	79	41	25	50	42	50	31	34	0.30	0.0	1	6,304	n.	35	n.	18	27	4	0	1.1	
Independence	3,910	51	58	25.98	29.97	− .02	50.0	+ 0.3	74	1	62	28	12	38	33	37	18	30	0.05	− 0.4	1	7,785	n.	41	n.	8	21	10	0	2.5	T.
Middle Plateau.							40.4	− 1.0										57	0.33	− 0.2										4.8	
Carson City	4,720	82	92	25.29	30.12	+ .08	41.4	+ 0.2	74	1	53	22	11	30	40	35	29	65	0.42	− 0.9	6	5,422	n.	46	sw.	9	12	9	10	4.5	3.7
Winnemucca	4,344	59	70	25.69	30.13	+ .09	38.7	− 2.0	65	1	51	17	29	27	38	32	22	51	0.16	− 0.7	4	7,943	sw.	54	sw.	10	9	8	14	6.1	0.4
Modena	5,479	10	38	24.58	30.14	......	37.7	......	68	17	54	10	31	21	47	29	18	67	0.11	......	2	......	w.	....	......	...	14	6	11	5.2	0.6
Salt Lake City	4,366	105	110	25.61	30.11	+ .03	40.0	− 1.6	65	1	49	25	24	31	28	33	24	55	2.48	+ 0.4	9	4,580	nw.	32	n.	11	18	7	6	3.5	15.1
Grand Junction	4,608	43	50	25.31	30.05	− .01	41.3	− 0.6	70	2	54	22	25	29	39	31	19	47	0.98	+ 0.2	10	4,661	nw.	32	nw.	22	13	7	11	4.7	2.8
Northern Plateau.							41.1	+ 1.5										70	1.08	− 0.7										5.8	
Baker City	3,471	53	58	26.47	30.13	+ .07	37.9	+ 2.4	60	21	47	22	24	29	27	32	25	65	0.97	− 0.8	13	4,342	s.	32	sw.	21	2	11	18	7.5	4.8
Boise	2,739	61	68	27.21	30.12	+ .04	42.6	− 1.3	69	16	53	25	24	32	34	36	28	61	1.13	− 0.7	10	3,843	nw.	29	s.	9	11	11	9	5.1	3.9
Lewiston	770	52	61	......	......	......	47.4	......	68	16	57	30	5	38	30	....	....	....	0.94	......	10	3,776	e.	33	nw.	25	9	16	6	5.5	T.
Pocatello	4,482	48	56	25.45	30.09	.00	36.8	+ 2.5	61	21	46	17	28	28	31	32	26	68	0.91	− 1.3	10	10,033	w.	42	w.	22	15	3	13	5.0	8.7
Spokane	1,943	99	107	27.98	30.07	+ .05	41.6	+ 1.9	64	15	50	26	5	33	31	36	31	70	1.08	− 0.3	10	4,816	sw.	30	sw.	3	2	12	17	7.2	T.
Walla Walla	1,000	65	73	29.01	30.10	+ .05	46.4	+ 0.9	70	15	55	29	5	38	32	44	41	84	1.29	− 0.5	8	5,442	s.	32	w.	3	8	22	1	4.8	T.
N. Pac. Coast Reg.							44.8	− 0.4										79	4.26	− 1.2										7.1	
Neah Bay	50	7	52	30.01	30.07	+ .05	43.1	− 1.4	52	6	47	33	11	39	14	41	39	86	7.92	− 2.6	26	5,257	w.	36	w.	2	1	6	24	8.4	
Port Crescent	259	14	20	......	......	......	41.0	− 0.6	54	15	48	28	24	34	23	....	....	....	1.50	− 3.2	19	3,343	w.	30	sw.	16	0	17	14	7.2	
Seattle	123	114	121	29.97	30.10	+ .08	46.0	+ 0.6	66	15	52	33	11	40	29	43	39	80	1.62	− 1.5	17	4,243	se.	24	sw.	16	3	13	15	7.2	
Tacoma	213	113	120	......	......	......	44.6	+ 0.2	67	15	52	32	24	38	31	....	....	....	2.97	− 1.0	16	5,112	sw.	28	sw.	3	6	6	19	7.1	1.5
Astoria	20	57	64	......	......	......	45.2	− 0.9	62	19	51	33	10	39	22	....	....	....	8.59	+ 1.5	22	......	nw.	....	......	...	6	14	11	6.4	
Portland, Oreg	154	203	213	29.96	30.12	+ .08	46.6	− 0.6	67	20	54	34	13	39	27	43	38	76	4.12	− 1.4	21	6,457	nw.	34	sw.	12	4	10	17	7.4	
Roseburg	518	56	67	29.56	30.13	+ .07	47.3	− 0.4	72	15	56	31	13	38	37	43	38	73	3.13	− 0.4	17	2,914	sw.	24	sw.	9	8	14	9	6.0	
Mid. Pac. C'st Reg.							54.0	+ 1.7										66	1.27	− 2.8										3.7	
Eureka	62	60	69	30.10	30.16	+ .10	49.2	+ 0.6	75	5	54	39	29	44	27	46	43	79	3.86	− 2.6	14	5,009	se.	37	n.	2	11	11	9	4.9	
Mount Tamalpais	2,375	11	18	27.60	30.10	+ .05	50.0	......	71	6	56	34	28	44	17	42	35	64	1.29	......	3	18,344	nw.	82	nw.	22	19	11	1	2.8	T.
Red Bluff	332	50	56	29.72	30.08	+ .05	56.4	+ 1.9	83	5	67	39	14	46	33	48	38	54	0.12	− 3.2	1	5,692	n.	35	n.	2	19	8	4	2.9	
Sacramento	69	106	117	29.99	30.07	+ .03	55.8	+ 1.1	73	6	65	38	28	47	23	49	42	64	0.48	− 2.5	2	6,434	nw.	36	n.	2	16	9	6	4.1	
San Francisco	155	161	167	29.95	30.11	+ .05	55.8	+ 2.2	78	3	63	44	30	49	22	50	45	71	0.80	− 2.3	3	7,496	w.	37	sw.	10	20	7	4	2.9	
Point Reyes Light	......	12	16	......	......	......	53.0	+ 2.9	80	5	60	42	11	46	29	....	....	....	1.11	− 3.4	4	17,091	nw.	66	nw.	8	15	5	11	4.7	
S. Pac. Coast Reg.							58.2	+ 2.7										67	0.61	− 1.6										2.9	
Fresno	330	67	70	29.70	30.05	+ .04	55.6	+ 1.1	76	19	67	35	28	44	33	49	44	69	0.34	− 1.0	1	3,599	nw.	28	nw.	8	22	7	2	2.7	
Los Angeles	338	74	82	29.64	29.99	− .03	60.3	+ 4.0	87	1	72	40	31	49	35	51	44	62	0.45	− 2.5	2	4,097	w.	24	nw.	23	13	17	1	2.9	
San Diego	87	94	102	29.89	29.99	− .04	60.0	+ 4.0	82	1	67	47	31	53	27	53	47	68	1.07	− 0.5	5	4,550	nw.	24	nw.	28	25	4	2	2.4	
San Luis Obispo	201	10	46	29.87	30.09	+ .04	57.0	+ 1.8	90	1	69	32	29	45	41	49	44	68	0.58	− 2.4	1	4,496	n.	24	w.	8	19	7	5	3.6	
West Indies.																															
Basseterre	29	41	54	30.01	30.04	......	77.8	......	85	30	83	68	11	73	16	70	67	70	0.81	......	11	7,401	e.	24	e.	5	23	8	0	2.8	
Bridgetown	30	57	65	29.96	30.00	......	78.5	......	87	31	84	69	11	72	15	72	68	72	0.50	− 0.8	12	6,677	e.	25	e.	11	10	14	7	5.1	
Cienfuegos	52	62	67	29.98	30.03	......	72.8	......	88	28	82	52	18	63	28	67	65	80	1.71	......	5	6,197	ne.	23	s.	27	26	3	2	2.2	
Grand Turk	11	6	20	......	......	......	77.0	......	88	6	83	63	9	71	19	....	....	....	0.79	......	9	......	se.	....	......	...	5	15	11	5.9	
Havana	57	87	105	29.99	30.05	......	72.3	......	87	13	79	55	18	65	24	65	62	75	0.52	− 1.3	3	10,159	e.	36	ne.	8	13	15	3	3.9	
Kingston	286	38	52	29.69	29.90	......	76.8	......	90	10	85	65	18	68	21	69	65	71	0.49	......	7	5,423	ne.	29	nw.	17	10	20	1	4.1	
Port of Spain	40	65	66	29.93	29.97	......	78.2	......	90	30	86	69	5	71	19	71	68	72	1.56	......	12	3,652	e.	17	e.	6	4	13	14	6.7	
Puerto Principe	352	55	62	29.70	30.05	......	74.6	......	94	21	86	52	17	63	34	67	64	79	1.64	......	9	5,799	ne.	25	e.	9	17	13	1	3.5	
Roseau	25	37	47	29.98	30.00	......	78.3	......	87	31	85	69	10	72	17	70	66	69	2.39	......	14	4,510	e.	24	e.	15	17	13	1	3.5	
San Juan	82	48	90	29.96	30.04	......	76.8	......	87	3	83	67	19	71	15	71	68	76	4.60	+ 2.3	19	8,736	e.	36	e.	9	18	12	1	3.6	
Santiago de Cuba	82	26	31	29.93	30.01	......	77.3	......	92	22	86	58	18	68	26	69	66	75	1.66	......	5	3,531	ne.	18	ne.	7	15	12	4	4.2	
Santo Domingo	57	37	44	29.99	30.05	......	75.2	......	87	30	82	61	31	68	21	70	68	79	2.27	......	14	4,468	n.	18	n.	17	14	11	6	4.2	
Willemstad	75	39	46	29.86	29.93	......	79.7	......	86	29	84	70	13	75	13	72	70	74	0.36	......	5	9,609	e.	24	e.	22	17	10	4	4.9	

NOTE.—The data at stations having no departures are not used in computing the district averages.

TABLE II.—*Climatological record of voluntary and other cooperating observers, March, 1901.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
Alabama.					
Ashville	78	19	52.0	10.14	T.
Benton	......	......	......	6.77	
Bermuda[d]	79	21	56.4	7.20	
Birmingham	79	21	56.1	5.81	
Bridgeport	......	......	......	8.24	
Burkville	......	......	......	6.70	
Calera	......	......	......	8.46	
Camp Hill	79	18	55.0	7.62	T.
Citronelle	81	27	59.2	4.35	
Clanton	76	23	53.8	7.23	T.
Daphne	81	27	60.2	6.91	
Decatur	78	15	51.0	6.41	T.
Eufaula[a]	78	20	54.7	7.82	
Eufaula[c]	......	......	......	7.52	
Eutaw	80	22	53.8	8.26	
Evergreen	79	23	56.6	8.08	
Florence[a]	......	......	......	4.34	......
Florence[b]	84	16	53.7	4.45	T.
Gadsden	76	19	48.8	9.05	
Goodwater	77	17	51.2	5.01	T.
Greensboro	79	23	53.6	5.23	T.
Greenville	......	......	......	7.64	
Hamilton	82	19	50.5	6.10	T.
Healing Springs	82	19	54.6	5.26	
Helena	......	......	......	4.50	T.
Highland Home	80	23	56.8	7.14	
Letohatchee	......	......	......	2.64	
Livingston[a]	81	21	53.0	1.39	
Lock No. 4	76	17	50.4	6.22	T.
Madison Station	78	15	50.8	6.31	T.
Maplegrove	77	16	48.8	8.32	
Marion	79	23	55.5	5.20	T.
Newbern	79	21	55.1	6.30	T.
Newburg	......	......	......	5.25	T.
Notasulga	......	......	......	7.74	
Oneonto	74	11	52.2	8.68	T.
Opelika	72[f]	22	52.2[d]	9.63	
Oxanna	75	18	54.7	5.17	0.5
Pineapple	82	20	53.8	3.00	
Prattville	78	20	55.0	......	
Pushmataha	82	21	56.0	3.07	
Riverton	80	11	48.4	3.89	T.
Scottsboro	78	15	48.4	7.09	
Selma	......	24	......	5.01	T.
Talladega	78	17	54.2	6.09	T.
Tallassee	......	......	......	7.17	
Thomasville	......	28	......	8.57	
Tuscaloosa	79	21	51.0	3.97	T.
Tuskegee	80	19	56.0	5.14	
Union Springs	77	23	54.0	8.95	T.
Uniontown	80	21	55.4	3.73	
Valleyhead	73	14	47.8	9.22	T.
Verbena	......	......	......	8.77	
Wetumpka	79	21	53.8	6.35	
Alaska.					
Killisnoo	43	12	34.6	5.40	26.0
Sitka	46	17	36.8	7.80	2.0
Arizona.					
Allaire Ranch	......	......	......	0.51	T.
Arivaca	85	28	55.6	0.53	
Arizona Canal Co. Dam	88	35	58.9	0.30	
Aztec*[1]	92	45	66.0	0.05	
Benson*[1]	71	37	54.7	T.	T.
Bisbee	77	28	50.6	0.88	T.
Bowie*[5]	70	39	56.8	0.75	
Buckeye	90	32	59.7	0.40	
Camp Creek	81	30	54.6	1.89	
Casagrande*[1]	80	45	61.6	T.	
Champie Camp	92	30	58.8	0.60	T.
Cochise*[5]	65	36	52.2	0.53	
Congress	82	36	58.4	0.35	T.
Dragoon Summit*[1]	71	35	48.7	T	T.
Dudleyville	87	27	54.8	1.35	
Fort Apache	74	14	47.5	1.20	2.0
Fort Defiance	65	17	38.2	0.17	2.0
Fort Grant	85	30	51.6	0.80	T.
Fort Huachuca	79	30	56.4	0.72	
Fort Mohave	90	36	62.1	0.00	
Gilabend*[1]	82	44	60.6	0.50	
Ingleside	89	33	59.3	0.34	
Jerome	74	30	50.2	0.50	T.
Maricopa*[1]	82	34	51.5	T.	
Mesa	87	31	57.2	0.73	
Mohawk Summit*[1]	94	50	66.8	0.18	
Mount Huachuca	78	27	52.0	0.82	
Natural Bridge	......	......	......	1.23	2.0
Nogales	81	25	51.5	0.24	
Oracle	75	31	52.4	1.19	
Oro	......	......	......	0.96	
Pantano	......	......	......	0.00	
Parker	95	34	63.0	T.	
Peoria	88	33	59.3	0.20	
Phoenix	89	30	58.7	0.23	
Pinal Ranch	......	......	......	1.27	1.5
Prescott	72	15	42.6	0.72	1.5
San Carlos	88	27	53.9	0.78	
***Arizona*—Cont'd.**					
Sentinel*[1]	95	49	67.9	T.	
Showlow	......	......	......	0.66	2.0
Signal	92	29	58.2	T.	
Strawberry	71	17	41.6	1.66	10.0
Supai	78	35	55.7	0.38	
Tombstone	78	30	53.1	0.31	T.
Tonto	80	28	53.2	0.58	
Tuba	72	23	46.0	0.20	
Tucson	86	25	55.6	0.64	
Vail*[5]	84	44	60.8	0.00	
Walnut Grove	......	......	......	0.00	
Willcox*[1]	75	30	53.2	0.31	
Yarnell	......	......	......	0.50	T.
Arkansas.					
Amity	81	18	51.0	6.69	
Arkadelphia	80	20	52.6	3.88	
Arkansas City	......	......	......	2.45	
Batesville	85	14	51.4	4.82	
Beebranch[c]	80	13	49.6	5.50	
Blanchard Springs	82	21	54.5	3.69	
Brinkley	80	18	53.1	3.45	
Camden[a]	......	......	......	3.69	
Camden[b]	78	24	53.0	3.57	
Conway	86	11	52.0	5.58	
Corning	79	16	47.4	3.87	T.
Dallas	79	11[c]	49.6	5.77	
Dardanelle	......	......	......	5.16	
Elon	82	23	55.3	4.75	
Fayetteville	81	8	46.6	3.88	T.
Fulton	......	......	......	4.93	
Hardy	80	12	48.4	4.79	T.
Helena[a]	......	......	......	4.32	
Helena[b]	80	20	54.0	3.76	
Hot Springs[b]	......	......	......	5.18	
Ione	82	11	51.2	5.23	
Jonesboro	81	18	54.0	4.72	
Keesees Ferry	85	11	48.6	4.35	0.1
Lacrosse	82	12	49.2	6.76	
Lonoke	83	17	54.4	4.47	
Lutherville	80	13	49.6	5.65	T.
Malvern	73	12	46.8	3.79	T.
Marianna	78	18	52.4	3.05	T.
Marvell	80	19	53.8	3.03	
Mossville[c]	77	9	44.9	5.86	T.
Mount Nebo	78	13	48.3	6.95	T.
New Gascony	82	18	52.6	4.45	
Newport[a]	......	......	......	5.36	T.
Newport[b]	81	14	51.2	4.19	T.
Newport[c]	80	27[d]	57.0[d]	5.20	......
Oregon	84	9	46.8	4.00	T.
Osceola	80	16	52.0	4.67	T.
Ozark	81	17	51.3	7.32	
Pinebluff	84	21	54.6	5.50	
Pocahontas	68	14	48.4	3.90	
Pond	83	4	45.8	3.51	2.0
Prescott	82	27	54.2	4.19	
Rison	84	18	53.0	3.60	
Rosadale	83	20	53.4	5.48	
Russellville[c]	81	17	51.4	6.38	
Silversprings	84	10	46.5	3.13	0.5
Spielerville	86	18	51.0	5.73	T.
Stuttgart	82	18	52.4	3.62	
Texarkana	81	24	54.8	3.20	
Warren	81	21	53.1	4.92	
Washington	82	21	53.7	5.68	
Wiggs	82	15	51.8	6.22	
Winchester	81	22	52.2	4.75	
Winslow	76	9	44.5	4.00	T.
Witts Springs	80	15	50.3	5.30	T.
California.					
Angiola	82	25	54.2	......	
Bakersfield	84	23	51.8	......	
Ballast Point L. H.	......	......	......	1.52	
Bear Valley	......	......	......	4.75	34.7
Bellevue	......	......	......	0.62	T.
Berkeley	74	40	55.4	0.91	
Bishop	78	21	48.0	T.	
Boca*[1]	56	7	32.7	2.24	21.0
Bodie	50	−14	23.4	1.58	15.0
Bowman	......	......	......	4.67	25.5
Branscomb	......	......	......	4.23	T.
Campbell	77	31	53.2	0.65	
Cape Mendocino L. H.	......	......	......	2.90	
Cedarville	66	20	39.2	1.42	9.0
Chico*[1]	85	40	58.3	0.24	
Cisco*[1]	48	20	32.4	4.70	33.0
Claremont	81	31	55.6	0.44	
Corning*[1]	80	39	54.8	0.00	
Crescent City	80	32	48.4	7.02	
Crescent City L. H.	......	......	......	6.34	
Cuyamaca*[5]	66	24	41.7	2.32	7.2
Delano*[1]	80	40	62.4	0.15	
Delta*[1]	81	34	53.3	1.58	
Drytown	74	32	53.0	1.58	
Dunnigan*[1]	74	36	54.4	0.21	
Durham*[5]	80	32	55.9	0.42	
***California*—Cont'd.**					
East Brother L. H.	......	......	......	0.60	
Edmanton*[1]	66	21	40.3	4.94	29.0
Elmdale	78	30	54.4	0.33	
Elsinore	94	29	57.6	0.42	
Escondido	92	32	58.3	0.52	
Fallbrook	87	34	57.6	0.42	
Folsom City*[1]	80	38	56.1	0.58	
Fordyce Dam	......	......	......	4.30	32.0
Fort Ross	73	39	50.2	1.24	
Fort Tejon	......	......	......	1.97	......
Georgetown	78	27	50.2	2.78	5.0
Gilroy (near)	85	26	54.8	0.82	
Grand Island*[5]	77	36	57.2	0.21	
Grass Valley	......	......	......	2.25	T.
Greenville	73	19	42.6	2.68	11.0
Hanford	79	30	53.8	......	
Healdsburg	85	34	56.4	0.92	
Hollister	80	30	53.0	1.02	
Humboldt L. H.	......	......	......	4.11	
Idylwild	......	......	......	1.23	6.5
Indio*[1]	91	50	65.1	0.00	
Iowa Hill*[1]	78	36	50.9	1.98	4.0
Irvine	90	46	64.4	0.28	
Jackson (near)	70	26	49.6	2.58	1.5
Jolon	......	......	......	0.58	
Kennedy Gold Mine	70	26	48.8	2.33	
Kent	......	......	......	1.75	
King City*[1]	76	35	49.6	0.45	
Kono Tayee	75	37	52.8	1.33	
Laguna Valley	......	......	......	0.95	9.0
Lamesa	......	......	......	0.97	
Laporte*[1]	63	21	37.2	6.24	46.7
Las Fuentes Ranch	......	......	......	0.00	
Legrand	75	31	53.8	0.92	
Lemoncove	81	31	56.6	0.50	
Lick Observatory	75	27	44.0	1.98	
Lime Point L. H.	......	......	......	0.53	
Lodi	74	34	55.2	0.68	
Los Gatos	79	37	55.6	1.09	
Mammoth*[1]	91	57	70.6	0.00	
Manzana	78	32	52.4	0.25	
Mare Island L. H.	......	......	......	0.91	
Merced[b]	78	33	54.6	0.51	
Mills College	......	......	......	1.35	
Milo	......	......	......	1.33	
Modesto*[1]	87	41	60.0	0.42	
Mohave*[1]	78	35	52.6	0.00	
Mokelumne Hill*[3]	......	33	48.8	1.76	
Monterio	78	30	50.4	2.02	
Monterey*[5]	76	42	57.6	1.28	
Morena	82	30	53.0	1.58	
Mountainview	......	......	......	0.51	
Mount St. Helena	......	......	......	2.13	T.
Napa	84	34	56.6	1.39	
Needles[f]	84	45	63.9	0.00	
Nevada City	76	27	47.6	2.35	5.0
Newhall*[1]	88	35	56.6	0.13	
Niles*[1]	84	42	58.7	1.02	
North Bloomfield	80	26	47.3	2.97	5.5
North Ontario	81	35	56.0	0.71	
North San Juan*[1]	83	31	51.5	4.51	0.3
Oakland	76	40	56.1	0.81	
Ogilby*[1]	92	47	66.6	0.00	
Oleta*[1]	71	33	48.6	1.95	
Orland*[1]	82	40	55.5	0.00	
Palermo	84	32	55.2	0.58	
Palomar Mountain	......	......	......	1.45	2.2
Paso Robles	78	29	52.7	0.63	
Peachland*[5]	80	34	56.2	1.43	
Piedras Blancas L. H.	......	......	......	0.52	
Pigeon Point L. H.	......	......	......	0.95	
Pilot Creek	......	......	......	3.74	18.5
Pine Crest	83	39	60.6	0.36	
Placerville	74	26	49.8	2.34	
Point Ano Nuevo L. H.	......	......	......	0.49	
Point Arena L. H.	......	......	......	1.15	
Point Bonita L. H.	......	......	......	1.02	
Point Conception L. H.	......	......	......	0.12	
Point Fermin L. H.	......	......	......	0.15	
Point George L. H.	......	......	......	3.61	
Point Hueneme L. H.	......	......	......	0.12	
Point Lobos	72	44	53.6	0.72	
Point Loma L. H.	......	......	......	0.85	
Point Montara L. H.	......	......	......	0.80	
Point Pinos L. H.	......	......	......	1.18	
Point Sur L. H.	......	......	......	0.74	
Pomona (near)	90	33	59.2	0.48	
Poway*[5]	84	35	58.0	0.34	
Quincy	66	23	41.9	2.55	8.0
Ranch House	......	......	......	0.24	
Redding	82	36	55.8	0.57	
Redlands	88	37	59.0	0.46	
Represa	74	34	54.5	0.56	
Riovista	75	38	55.5	0.70	
Riverside	90	34	59.8	0.12	
Roe Island L. H.	......	......	......	0.27	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Rosewood	81	29	53.0	0.11	
Sacramento	76	36	55.6	0.67	
Salinas *1	73	40	54.8	0.50	
Salton *1	95	47	66.3	0.00	
San Bernardino	91	31	57.1	0.43	
San Jacinto	86	31	56.0	0.33	
San Jose	......	......	......	0.75	
San Luis L. H	......	......	......	0.40	
San Mateo *1	77	44	55.2	0.75	
San Miguel *1	77	36	55.1	0.20	
Santa Barbara	83	41	59.0	0.16	
Santa Barbara L. H	......	......	......	0.20	
Santa Clara	......	......	......	0.53	
Santa Cruz	80	30	54.0	0.94	
Santa Cruz L. H	......	......	......	0.95	
Santa Maria	87	34	58.3	0.25	
Santa Monica	......	......	......	0.20	
Santa Paula	90	37	61.0	0.42	
Santa Rosa *1	80	34	52.4	0.90	
Shasta	85	36	58.4	1.46	
Sierra Madre	83	39	59.5	1.14	
Snedden	......	......	......	0.20	2.0
Sonoma	......	......	......	1.21	
S. E. Farrallone L. H	......	......	......	0.70	
Stanford University	73	35	52.8	0.87	
Stockton	74	34	52.6	0.36	
Storey	75	32	55.2	0.50	
Summerdale	71	16	41.6	3.00	17.0
Susanville	68	21	41.8	1.50	11.0
Tehama *1	81	43	57.2	T.	
Tejon Ranch	80	37	57.1	0.95	
Thermalito	82	35	56.5	0.50	
Trinidad L. H.	......	......	......	3.78	
Truckee *1	62	6	34.6	2.50	25.0
Tulare *c*	84	28	55.2	0.36	
Ukiah	85	28	53.0	1.51	
Upperlake	83	30	53.4	1.06	
Upper Mattole *1	87	36	49.3	4.71	
Vacaville *1	80	38	56.7	0.87	
Ventura	86	38	58.5	0.26	
Visalia *b*	79	29	54.2	0.32	
Volcano *1	95	55	68.2	T.	
Wasco	82	30	53.8	0.11	
West Saticoy	......	......	......	0.26	
Wheatland	73	33	54.0	0.77	
Williams *1	79	43	59.4	T	
Wilmington *1	79	40	57.8	0.05	
Wire Bridge *5	80	32	54.8	1.17	
Yerba Buena L. H	......	......	......	0.68	
Yreka	67	24	44.4	0.98	......
Yuba City *5	79	40	58.6	0.47	
Colorado.					
Alford	70	— 8	30.8	1.62	21.5
Amity	......	......	......	0.20	2.2
Arkins	......	......	......	1.57	19.0
Ashcroft	......	......	......	2.56	38.9
Blaine	85	12	42.2	0.60	6.0
Boulder	75	9	40.0	1.74	18.5
Boxelder	......	......	......	1.62	......
Breckenridge	45	— 9	17.8	2.40	40.3
Buenavista	......	......	......	0.74	10.5
Canyon	75	10	40.6	1.53	9.0
Castlerock	78	0	35.4	1.04	14.5
Cedaredge	75	15	38.2	1.18	8.5
Cheyenne Wells	79	2	35.7	0.71	4.8
Clearview	55	— 2	26.8	2.61	40.0
Collbran	64	10	35.5	2.44	19.5
Colorado Springs	72	2	36.3	1.29	19.5
Cope	75	10	37.7	1.18	13.0
Crook	73	6	36.0	1.79	24.0
Delta	75	12	39.6	0.56	......
Dumont	......	......	......	1.22	18.0
Durango	71	1	32.7	0.04	1.0
Fort Collins	72	— 8	35.7	1.88	16.5
Fort Morgan	75	5	35.9	1.07	12.0
Fox	......	......	......	2.40	26.5
Gleneyrie	69	4	35.8	1.66	22.2
Greeley	73	— 2	38.7	0.95	7.7
Grover	......	......	......	0.30	3.5
Gunnison	56	1	27.4	0.49	8.0
Hamps	76	6	34.6	1.50	19.0
Hoehne	79	5	39.0	0.80	5.0
Holly	84	10	41.2	0.90	7.5
Holyoke (near)	80	3	35.4	1.43	18.2
Hugo	......	......	......	0.80	10.0
Husted	69	— 6	33.2	2.04	28.8
Lake Moraine	52c	— 5	25.8	2.40	31.9
Lamar	86	14	43.6	0.49	4.8
Laporte	......	......	......	1.42	19.0
Las Animas	80	9	41.4	1.40	6.5
Lay	61	5	33.3	0.89	....
Leadville (near)	......	......	......	1.27	20.0
Leroy	73	8	35.0	1.60	16.0
Longs Peak	48	— 6	23.9	1.19	18.0
Mancos	64	10	35.4	1.17	12.0
Marshall Pass	......	......	......	1.55	25.0
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Meeker	59	3	32.6	2.09	24.5
Mitchell	......	......	......	0.46	8.2
Montrose	......	......	......	0.54	T
Moraine	51	— 5	27.8	1.06	16.5
Pagoda	57	3	32.1	2.41	28.0
Parachute	66	19	39.0	1.42	0.5
Perrypark	......	......	......	0.60	8.3
Rangely	63	8	35.0	0.57	8.0
Rockyford	83	10	40.8	1.00	9.0
Rogers Mesa	70	15	38.4	0.88	5.6
Ruby	......	......	......	5.41	83.0
Saguache	69	5	33.3	0.27	4.0
Salida	69	1	34.4	0.94	14.5
San Luis	63	9	33.4	0.92	9.4
Santa Clara	70	6	33.0	2.83	41.2
Sapinero	......	......	......	1.19	18.5
Sargents	......	......	......	1.78	31.0
Seibert	......	......	......	0.80	9.5
Silt	62	14	36.6	1.33	11.5
Springfield	......	......	......	0.85	8.5
Sugarloaf	58	— 1	29.0	2.17	29.0
Telluride	52	— 5	26.4	1.98	34.5
Trinidad	78	9	41.5	1.51	22.0
T. S. Ranch	66	19	38.0	1.78	19.2
Twinlakes	......	......	......	0.74	14.0
Vilas	......	......	......	0.25	2.5
Wagon Wheel	56	— 4	26.2	0.40	8.0
Walden	48	—12	24.6	0.58	10.2
Wallet	......	......	......	1.21	13.0
Westcliffe	58	— 1	28.8	2.34	35.2
Wray	79	6	37.6	2.51	18.0
Yuma	......	......	......	2.44	24.0
Connecticut.					
Bridgeport	54	10	36.6	6.92	2.1
Canton	54	— 1	32.6	5.96	4.5
Colchester	55	4	35.4	6.97	0.8
Falls Village	......	......	......	6.09	11.0
Hartford *b*	52	8	34.6	7.45	0.5
Hawleyville	52	5	35.0	8.35	3.0
Lake Konomoc	......	......	......	8.61	......
Middletown	54	7	35.9	6.32	2.5
New London	51	10	35.6	5.33	......
North Grosvenor Dale	55	2	34.0	7.17	T.
Norwalk	58	3	35.8	6.59	1.5
Southington	52	7	35.4	6.80	2.5
Storrs	54	4	33.0	7.18	2.5
Voluntown	56	— 1	35.3	8.84	T
Wallingford	......	......	......	4.36	......
Waterbury	56	6	35.8	7.44	1.0
West Cornwall	49	— 3	30.5	7.33	14.4
West Simsbury	......	......	......	5.52	4.0
Delaware.					
Millsboro	74	10	43.0	3.80	1.0
Newark	70	8	40.1	3.52	T.
Seaford	73	12	45.0	3.01	0.8
Wyoming	......	......	......	4.09	1.5
District of Columbia.					
Distributing Reservoir *5	71	14	45.1	2.02	......
West Washington	77	11	44.2	2.99	T.
Florida.					
Archer	84	24	60.0	9.95	
Bartow	90	31	62.5	3.56	
Carrabelle	77	33	58.2	11.23	
Clermont	89	33	65.1	3.20	
De Funiak Springs	80	22	57.3	8.71	
Deland	91	30	62.7	......	
Earnestville	89	32	64.5	4.45	
Eustis	88	31	64.4	4.77	
Federal Point	85	28	60.7	7.07	
Flamingo	90	39	69.8	......	
Fort George *1	80	33	60.3	......	
Fort Pierce	90	36	66.0	3.81	
Gainesville	86	25	61.0	6.97	
Huntington	87	31	61.4	3.81	
Hypoluxo	88	41	69.8	3.62	
Inverness	86	31	61.4	6.45	
Jasper	83	27	59.2	7.70	
Kissimmee	88	33	63.2	3.51	
Lake Butler	85	28	61.2	8.27	
Lake City	84	24	60.6	7.78	
McAlpin	......	......	......	5.95	
Macclenny	87	24	59.4	7.87	
Manatee	90	31	63.6	3.58	
Marco	89	40	67.2	2.20	
Marianna	80	22	58.8	5.51	
Merritt Island	86	41	65.9	6.69	
Miami	86	39	69.2	1.76	
Micanopy	86	30	61.2	8.93	
Middleburg	86	23	59.0	8.71	
Myers	88	39	64.2	2.67	
New Smyrna	88	31	61.4	1.65	
Nocatee	91	31	65.0	3.37	
Ocala	86	28	61.4	4.49	
Orange City	89	29	63.0	2.59	
Orlando	88	33	64.2	3.89	
Plant City	88	30	61.0	3.83	
Florida—Cont'd.	°	°	°	*Ins.*	*Ins.*
Quincy	82	21	57.3	3.97	
Rockwell	85	27	62.7	5.42	
St. Andrews	71k	29	56.0e	7.93	
St. Augustine	82	34	61.0	6.52	
St. Francis	90	28	60.0	4.76	
Sebastian	88	37	65.5	2.35	
Stephensville *1	82	30	57.6	7.70	
Sumner	82	30	60.0	8.80	
Switzerland *1	84	31c	58.8	9.64	
Tallahassee	79	26	56.3	7.76	
Tarpon Springs	88	31	63.2	5.10	
Titusville	90	34	62.9	3.70	
Wausau	83	24	56.5	9.43	
Wewahitchka	82	27	57.0	8.38	
Georgia.					
Adairsville	75	17	51.6	7.64	T.
Albany	......	......	......	5.51	
Allapaha	81	23	55.4	5.78	
Allentown	82	12	55.8	6.07	
Americus	78	20	54.4	7.31	
Athens *b*	74	19	49.8	4.78	
Brent	79	17	53.4	7.80	
Canton	......	......	......	4.17	
Carlton	......	......	......	4.70	
Clayton	73	13	47.6	8.53	T.
Covington	79	16	53.2	6.56	T.
Dahlonega	74	6	47.2	6.79	T.
Diamond	71	10	47.0	6.91	3.0
Dublin	......	......	......	5.97	
Elberton	77	19	53.9	4.99	
Experiment	75	19	54.0	6.04	T.
Fitzgerald	86	19	57.0	7.39	
Fleming	84	18	56.8	4.47	
Fort Gaines	77	23	55.3	4.59	
Franklin	......	......	......	3.66	
Gainesville	72	17	48.7	6.69	
Gillsville	77	16	51.8	6.50	
Greenbush	76	14	50.4	8.23	
Harrison	81	18	55.1	5.51	
Hawkinsville	82	24	55.4	7.71	
Hephzibah	78	24	54.8	5.20	
Jesup	85	22	57.6	6.00	
Lost Mountain	78	16	51.8	5.14	
Louisville	82	20	55.3	5.01	
Lumpkin	78	23	55.5	7.78	
Marshallville	77	21	55.9	6.78	
Mauzy	83	20	57.5	6.20	
Milledgeville	82	20	53.2	......	
Millen	84	20	56.6	6.37	
Morgan	79	20	55.3	8.25	
Naylor	83	24	57.8	6.35	
Newnan	72	19	51.0	5.12	
Oakdale	......	......	......	2.63	
Piscola	80	25	58.0	6.00	
Point Peter	80	15	51.1	5.12	
Poulan	82	19	55.7	6.70	
Putnam	78	19	56.4	6.65	T.
Quitman	83	21	56.8	6.95	
Ramsey	75	14	51.0	5.84	T.
Resaca	......	......	......	5.91	
Rome	75	16	49.6	9.17	T.
Statesboro	85d	21d	57.6d	5.25	
Talbotton	78	17	53.9	8.65	
Thomasville	81	24	57.7	6.27	
Toccoa	75	15	47.6	8.55	
Valona	81	22	56.8	4.37	
Vidalia	82	21	55.3	4.49	
Washington	......	......	......	3.10	
Waycross	85	23	55.6	4.22	
Westpoint	76	19	54.4	5.58	T.
Woodbury	......	......	......	7.19	
Idaho.					
Albion	65	15	36.0	1.59	13.0
American Falls	64	12	35.4	0.58	7.0
Atlanta	55	2	35.0	1.81	14.5
Blackfoot	62	13	34.8	0.31	2.5
Burnside	43	9	26.0	0.75	7.5
Cambridge	63	19	39.8	......	......
Chesterfield	56	6	28.1	1.01	8.0
Downey	56	10	34.4	0.90	9.0
Forney	67	5	31.4	2.97	24.0
Garnet	72	22	45.8	0.18	
Hagerman	72	21	43.5	0.26	......
Hailey	57	7	30.0	1.44	12.0
Kootenai	54	11	33.5	0.80	8.0
Lake	54	—16	27.6	2.40	24.0
Lakeview	63	24	39.7	2.39	1.0
Lost River	52	4	30.0	1.08	12.0
Moscow	61	26	39.6	2.28	
Murray	65	19	36.7	3.91	20.0
Oakley	67	17	37.6	0.15	1.5
Ola	67	21	39.2	1.74	......
Paris	52	8	30.2	0.30	......
Pollock	65	24	42.8	2.02	
Priest River	61	18	38.2	1.97	5.5
St. Maries	65	24	40.1	2.33	2.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Idaho—Cont'd.					
Soldier	45	— 2	25.5	1.13	12.0
Swan Valley	51	— 2	31.2	0.38	4.4
Weston	63	15	37.0	0.60	2.5
Illinois.					
Albion	74	9	41.0	4.00	1.5
Aledo	68	7	36.9	2.72	3.2
Alexander	71	9	40.8	2.75	1.8
Ashton	66	3	33.8	3.12	7.2
Astoria	71	9	39.2	3.07	0.2
Aurora a	67	3	34.2	4.11	4.3
Beardstown	......	......	......	3.72	4.1
Bloomington	72	6	39.7	4.04	2.4
Bushnell	71	9	38.2	2.85	T.
Cambridge	68	6	35.4	3.11	4.2
Carlinville	71	10	41.8	4.15	3.5
Carlyle	......	......	......	3.85	......
Centralia	72	12	45.6	3.85	T.
Charleston	72	6	41.6	3.82	0.8
Chemung	62	0	30.8	4.54	10.0
Chester	......	......	......	3.39	T.
Cisne	71	10	43.7	3.64	T.
Coatsburg	71	9	39.9	3.09	0.8
Cobden	74	10	46.6	5.73	T.
Danville	71	15	42.5	2.28	0.5
Decatur	71	7	40.2	3.23	0.5
Dixon	70	4	35.6	2.98	3.7
Dwight	69	4	36.8	3.17	2.5
Effingham	68[b]	8[c]	41.4[c]	3.32	1.0
Equality	74	11	47.8	3.26	T.
Flora	74	9	43.6	3.46	0.8
Friendgrove *[b]	70	12	43 2	4.39	......
Galva	69	4	35.8	2.70	4.6
Grafton	......	......	......	2.46	1.0
Greenville	71	10	42.8	3.32	1.0
Griggsville	74	10	41.8	3.25	......
Halfway	74	13	46.0	3.36	0.5
Halliday	72	12	47.6	4.21	0.7
Havana	64	8	39.6	7.30	0.5
Henry	72	5	37.7	3.97	11.0
Hillsboro	71	10	41.0	3.05	T.
Joliet	67	5	35.2	3.62	5.8
Kishwaukee	66	— 1	33.4	3.93	7.0
Knoxville	70	3	35.6	2.55	1.9
Lagrange	68	3	34.6	3.78	4.8
Laharpe	70	10	38.3	2.24	2.0
Lanark	66	1	33.5	2.75	5.2
Loami	......	......	......	2.67	T.
McLeansboro	75	13	44.7	3.79	T.
Martinsville	69	9	41.6	1.28	T.
Martinton	70	3	37.4	4.06	T.
Mascoutah	70	14	43.8	3.10	......
Mattoon	70[i]	10[i]	42.9[i]	2.48	0.4
Minonk	68	5	37 0	3.60	4.5
Monmouth	69	5	36.2	2.00	1.8
Morgan Park	......	......	......	3.98	5.2
Morrisonville	69	8	40.8	2.26	0.7
Mount Carmel	......	......	......	5.20	0.7
Mount Pulaski	71	8	40.0	3.68	1.8
Mount Vernon	70	9	42.1	3.79	T.
New Burnside	75	11	47.1	3.72	T.
Olney	72	9	43.8	4.24	5.2
Ottawa	71	7	37.6	3.51	4.5
Palestine	76	9	41.4	5.57	T.
Pana	71	9	41.6	3.71	T.
Paris	71	7	39.9	3.87	......
Peoria a	......	......	......	2.90	2.0
Peoria b	72	10	38.7	4.31	T.
Philo	73	6	39.6	3.11	......
Plumhill	70	13	44.0	3.12	T.
Rantoul	72	5	38.4	3.98	1.6
Raum	76	10	47.0	4.10	3.0
Riley	63	0	32.0	3.38	3.5
Robinson	72	9	42.9	3.95	T.
Roundgrove	52	2	31.4	2.92	5.3
Rushville	73	10	40.0	3.37	1.8
St. Charles *[b]	65	0	33.6	2.76	6.5
St. John	75	12	47.8	4 59	T.
Strawn	69	4	37.8	3.59	......
Streator	72	5	37.7	3.49	......
Sullivan	62	8	38.9	3.61	0.5
Sycamore	65	2	33.3	3.86	5.4
Tilden	70	13	45.0	3 03	T.
Tiskilwa	66	4	34.9	3.53	5.2
Tuscola	73	7	39.3	3.29	T.
Walnut	69	6	36.7	2.57	2.5
Wellington	71	5	38.1	4.12	T.
Winchester	70	11	40.4	3.03	T.
Winnebago	65	0	32.9	3.52	15.0
Yorkville	69	3	35.0	4.05	1.8
Zion	67	2	33.2	2.21	7.0
Indiana.					
Anderson	72	3	39.2	3.23	1.5
Angola	68	— 1	32.8	3.26	3.8
Auburn	......	......	......	1.15	T.
Bloomington	72	2	42.6	5.42	9.0
Bluffton	......	1	......	2.76	1.1
Indiana—Cont'd.					
Bright	66	3	39.6	1.96	T.
Butlerville	75	4	43.6	3.33	1.7
Cambridge City	73	1	39.4	2.95	1.6
Columbus	75	5	42.8	2.48	1.1
Connersville	75	1	39.4	2.48	1.2
Delphi	72	3	36.3	3.43	3.5
Edwardsville *[1]	75	9	46.0	3.57	0.2
Fairmount	72	2	37.3	3.37	1.5
Farmland	72	3	38.6	2.49	3.0
Franklin *[1]	73	7	41.5	2.36	2.0
Greencastle	67	5	40.0	3.58	1.4
Greensburg	70	0	41.0	3.36	1.2
Hammond	66	2	36.0	5.26	0.9
Hector	71	0	37.8	1.65	2 0
Huntington	70	3	36.4	4.58	9.0
Jeffersonville	78	10	46.0	3.45	T.
Knightstown [f]	70	3	37.4	3.65	3.0
Kokomo	69	5	37.6	3.59	2.8
Lafayette	70	3	38.7	5.26	3.5
Laporte	67	3	35.2	4.10	6.5
Logansport	69	3	37.8	3.29	1.0
Madison a	76	6	44.0	3.74	4.0
Marengo	77	8	45.0	3.48	0.2
Marion	73	2	38.6	3.95	4.2
Markle	71	1	37.8	3.55	3.5
Mauzy	73	0	40.4[c]	3.25	4.5
Mount Vernon	80	14	45.2	3.74	T.
Northfield	70	2	38.4	4.00	2.0
Paoli	79	5	44.1	3.37	0.5
Prairie Creek	71	8	43.6	3.30	......
Princeton	76	10	43.1	3.55	1.0
Richmond	75	2	40.7	2.74	T.
Rockville	72	5	40.2	3.87	T.
Salem	80	5	45.0	3.33	1.0
Scottsburg	77	8	45.0	3 26	T.
Seymour	72	5	42.0	3.30	1.0
Shelbyville	73[c]	5[c]	40.2[c]	3.07	T.
South Bend	68	1	35.4	4.32	8.5
Syracuse	68	0	35.2	4.41	8.5
Terre Haute	71	8	42.4	4.39	2.5
Topeka	68	3	36.4	1.10	......
Veedersburg	71	4	41.0	3.78	T.
Vevay	76	7	44.6	3.07	0.2
Vincennes	78	10	43.0	3.70	T.
Washington	74	10	42.1	3.52	......
Winamac	70	10	41.6	2.48	2.6
Worthington	73	7	42.2	3.91	2.1
Indian Territory.					
Bengal	81	13	49.9	5.10	
Chickasha	86	15	52.3	0.25	
Claremore	86	10	47.4	2.25	
Fairland	84	11	46.0	3.38	1.0
Hartshorne	84	15	51.8	3.37	
Healdton	84	8	53.0	0.69	T.
Lehigh	84	16	53.2	2.03	
Marlow	85	17	51.2	0.19	
Muscogee	85	12	49.0	2.11	
Pauls Valley	84	14	51.6	0.64	
Roff	84	......	......	0.90	
Ryan	84	21	55.0	0.10	
South McAlester	......	......	......	2.77	
Tahlequah	80	11	47.7	3.30	T.
Tulsa	......	......	......	1.57	
Wagoner	84	9	49.0	2.39	T.
Webbers Falls	86	13	51.0	2.92	
Iowa.					
Afton	68[c]	5	35.0	3.19	16.5
Albia	68[c]	7	35.0	2.74	8.0
Algona	57	— 3	32.0	2.21	18.0
Alta	63	— 2	31.8	2.34	17.5
Amana	65	4	36.4	3.48	9.4
Ames b	67	1	34.3	1.64	8.5
Atlantic	76	8	36.0	3.02	26.0
Bancroft	63	— 5	31.8	2.60	15.0
Baxter	72	5	36.8	4.11	8.0
Bedford	72[a]	9	34.8	3.09	
Belknap	68	8	38.8	2.73	4.0
Belleplaine	65[b]	3	34.3[c]	5.02	10.5
Bonaparte	70	10	37.4	2.50	2.0
Britt	61	— 4	31.0	1.35	8.2
Buckingham	......	......	......	2.59	10.0
Burlington	70	10	39.0	3.30	2.5
Bussey	......	......	......	2.05	6.5
Carroll	67	1	35.0	2.78	25.5
Cedar Rapids	67	1	34.6	2.74	12.8
Chariton	66	7	36.4	2.95	11.2
Charles City	58	— 3	31.4	2.65	8.5
Clarinda	75	10	37.4	3.64	18.0
Clearlake	59	— 5	30.6	2.10	16.0
Clinton	68	5	34.7	3.86	4.5
College Springs	70	8	36.5	2 42	6.8
Columbus Junction	69	5	37.0	3.00	3.5
Corning	65	7	35.2	2.80	10.8
Council Bluffs	75	8	37.2	3.74	25.5
Cresco	51	— 6	29.0	2.78	11.2
Cumberland	......	......	......	1.55	11.0
Iowa—Cont'd.					
Danville	......	......	......	2.65	2.0
Decorah	57	— 4	30.6	2.82	15.0
Delaware	64	— 1	30.3	2.16	8.0
Denison	69	— 8	33.1	1.69	15.7
Desoto	66	7	36.4	1.82	17.0
Dows	63	— 4	32.5	3.31	15.0
Eldon	69	6	37.7	2.82	2.9
Elkader	65	0	33.4	2.62	16.0
Emerson	......	......	......	4.50	......
Estherville	60	— 6	30.3	1.15	9.1
Fayette	61	— 4	31.3	3.25	14.5
Fonda	......	......	......	3.56	30.6
Forest City	67	— 6	30.4	1.95	14.0
Fort Dodge	62	0	32.4	1.50	15.0
Fort Madison	......	......	......	3.75	1.0
Fruitland	70	5	36.2	2.15	3.0
Galva	65[c]	— 2	32.5	3.40	8.0
Gilman	......	......	......	2.17	......
Glenwood	71[c]	7	37.4	1.75	15 2
Grand Meadow	56[c]	— 3	31.8[c]	2.55	12.5
Greene	62	— 2	32.2	2.24	6.0
Greenfield	68	5	36.2	2.32	10.5
Grinnell	64	4	34.3	2.98	......
Grinnell (near)	65	2	34.0	3.20	8.0
Grundy Center	65	0	32.7	3.17	5.0
Guthrie Center	66	6	35.4	1.55	15.5
Hamburg	......	......	......	1.78	4.3
Hampton	66[f]	— 3	33.4[c]	3 38	21.0
Harlan	68	4	34.8	3 26	29.3
Hawkeye	......	......	......	2.10	19.0
Hedrick	68	5	35.6	2.40	7.0
Hopeville	66	7	35.6	2.76	......
Hoprig	......	......	......	1.02	7.8
Humboldt	60	— 2	33.8	1.80	15.3
Independence	64	— 2	32.0	1.62	11.0
Indianola	66	4	36.5	2.47	10.8
Iowa City	68	8	35.3	3.62	7.5
Iowa Falls	63	— 2	31.2	2.73	15.5
Jefferson	......	......	......	3.45	19.6
Keosauqua	69	11	38.8	3.12	......
Knoxville	67[d]	2	36.8	3.34	9.5
Lacona	......	......	......	3.85	12.8
Lansing	58[c]	— 2	33.0	3.73	20.6
Larchwood	67	— 7	32.6	......	......
Larrabee	65	— 2	32.4	1.98	12.1
Leclaire	......	......	......	2.53	5.0
Lemars	68	1	34.4	1.06	6.5
Lenox	67	6	36.0	2.50	4.5
Logan	70	8	37.4	3.00	28.0
Maple Valley	......	......	......	1.42	11.5
Maquoketa	66	1	35.4	3.03	6.0
Marshalltown	67	2	35.0	3.71	......
Monticello	65	— 2	32.6	3.38	13.5
Mooar	59	5	32.6	2.56	......
Mountayr	59	7	35.8	3.04	15.5
Mount Pleasant	69	8	37.0	2.33	......
Mount Vernon b	66	0	33.5	3.32	13.5
New Hampton	58	— 4	30.2	1.65	14.0
Newton	66	3	34.2	3.47	16.0
Northwood	60	— 5	32.5	2.25	19.0
Odebolt	69	3	34.7	2.93	23 5
Ogden	64[c]	0	33.6	1.61	11.5
Olin	64	2	32.7	3.41	8.5
Onawa	73	5	36.2	2.86	......
Osage	51	— 5	29.1	2.50	15.2
Oskaloosa	69	5	36.1	2.84	4.9
Ottumwa	70[c]	12[d]	38.0[c]	3.40	8.0
Ovid	69	7	35.2	2.75	8.7
Pacific Junction	71[d]	7	36.4	2.70	21.5
Pella	78[c]	5[c]	36.2[d]	......	......
Perry	66[b]	4[e]	35.4[e]	1.60	16.0
Plover	60	0	31.3	2.75	27.5
Primghar	60[b]	9[k]	32.8[l]	......	......
Redoak	71	5	36.1	5.25	27.5
Ridgeway	56	— 2	32.1	4.28	17.7
Rockwell City	66	1	34.6	2.85	28.0
Ruthven	57[m]	— 5	29.6[z]	1.70	17.0
Sac City	63	1	33.4	2.31	17.2
Scranton	62	3	34.3	1.17	15.0
Sheldon	65	— 4	31.8	1.39	5.6
Sibley	65[c]	— 4[e]	32.8[e]	1.35	4.0
Sigourney	70	5	37.0	3.41	7.2
Sioux Center	65[f]	— 3[e]	34.4[e]	1.41	8.5
Spirit Lake	61[d]	— 8[e]	32.4[d]	0.50	5.0
Storm Lake	62	— 2	32.2	1.82	13.3
Stuart	67	2	31.0	2.00	15.0
Thurman	70	1	36.2	2.81	......
Toledo	70[b]	2	35.9[i]	3.97	......
Villisca	70	7	37.2	4.35	23.0
Vinton *[1]	66	6	33.4	2.65	10.0
Wapello	66	11	36 9	2.40	4.0
Washington	69[i]	4	36.2[e]	1.67	......
Washta	......	......	......	2.18	14.0
Waterloo	65	0	33.1	2.95	9.0
Waverly	63	— 1	32.8	3.51	9.4
Westbend *[1]	57	3	30.4	2.49	21.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Whitten	62	− 2[i]	31.5[e]	0.70	5.5
Wilton Junction	67	5	35.6	3.21	5.0
Winterset	64[g]	0	31.8[d]	4.13	19.0
Kansas.					
Abilene [f]	79	13	41.9	2.60	8.0
Achilles	84[d]	2[e]	37.7[e]	1.95	19.5
Altoona	85	9	44.3	2.76	T.
Anthony	.....	.....	.....	0.31	3.0
Atchison *a*	79	13	40.2	3.45	5.5
Beloit	75	7	37.8	1.35	8.0
Burlington	85	10	44.4	1.45	.....
Chanute	86	10	47.4	4.20	T.
Colby	89	0	37.7	2.25	18.8
Coolidge	82	10	40.4	0.30	3.0
Delphos	81	10	41.6	1.22	7.0
Dresden	83	8	39.1	2.02	13.2
Ellinwood	85	11	41.9	1.18	8.0
Emporia	77	14	44.2	2.00	T.
Englewood	88	9	45.5	1.19	6.0
Eureka	.....	.....	.....	1.20	T.
Eureka Ranch	86	4	39.6	1.36	8.0
Fallriver	85	8	45.6	3.42	T.
Fort Leavenworth	79[e]	11[e]	42.4[e]	1.40	1.8
Frankfort	81	9	40.6	2.65	9.5
Garden City	85	11	41.3	2.20	6.5
Gove *[1]	83	14	39.0	1.50	.....
Grenola	85	5	44.7	2.89	T.
Harrison	80	7	39.8	1.62	12.0
Horton	77	12	40.0	1.26	3.0
Hoxie	84	8	39.0	2.11	19.6
Hutchinson	84	10	43.2	1.73	2.0
Independence	83	11	45.8	3.76	T.
Jetmore	87	6	42.6	0.59	1.5
Lakin	85	12	41.4	0.64	4.0
Lawrence	80	12	42.2	3.37	4.0
Lebanon	75	7	38.6	1.40	6.0
Lebo	81	12	42.2	2.34	T.
Leoti	84	.....	.....	1.05	8.0
Little River	83	13	42.2	1.30	3.9
Macksville	82	9	41.6	0.69	0.7
McPherson	84	13	42.6	1.65	2.0
Madison	85	15	43.6	2.05	.....
Manhattan *c*	.....	12	.....	1.80	7.5
Marion	76	12	43.8	1.70	3.0
Medicine Lodge	87	11	45.0	0.51	2.5
Minneapolis	82	10	41.3	1.18	4.0
Moran	78	11	42.8	2.46	T.
Mounthope *[1]	81	16	43.5	0.53	1.0
Ness City	85	12	42.8	0.44	1.2
Newton	84	7	41.6	0.95	1.0
Norwich	85	10	45.2	0.20	T.
Oberlin	.....	.....	.....	3.05	19.0
Olathe	80	11	42.8	2.71	8.5
Osage City	83	10	43.0	1.36	0.2
Osborne	.....	.....	.....	2.00	7.5
Oswego	84	9	45.7	5.04	T.
Ottawa	87	10	43.0	2.74	2.0
Phillipsburg	.....	10	.....	1.93	13.0
Rome	86	12	46.4	0.16	0.2
Salina	84	10	41.4	1.43	9.0
Sedan	83	7	45.2	2.77	T.
Seneca	79	11	39.8	1.40	6.0
Toronto	85	9	43.5	1.90	0.8
Tribune	81[e]	9[d]	36.9[d]	0.20	2.0
Ulysses	88	10	45.3	1.41	7.1
Valley Falls	78	10	42.2	1.30	3.5
Viroqua	85	13	42.6	0.52	3.0
Wakeeney (near) *[1]	80	14	38.8	1.42	9.2
Wallace	.....	.....	.....	0.60	4.0
Wamego *[1]	79	14	40.4	1.70	9.7
Winfield	85	9	47.2	1.04	.....
Yates Center	83	5	43.8	0.92	T.
Kentucky.					
Alpha *[3]	.....	7	48.6	3.97	T.
Anchorage	79	8	46.3	3.15	0.9
Bardstown	80	7	47.0	4.35	0.5
Berea	80	4	47.6	2.80	1.0
Blandville	75	13	46.2	5.13	0.2
Bowling Green	78	12	47.9	3.35	T.
Burnside	.....	.....	.....	3.35	0.5
Carrollton	78	7	45.8	1.62	T.
Catlettsburg	77	3	43.4	1.95	T.
Centertown	79	12	47.8	3.42	T.
Earlington	80	16	48.2	4.45	0.4
Edmonton	80	7	48.4	3.81	1.0
Eubank	79	13	43.6	3.45	1.0
Falmouth	.....	.....	.....	2.60	1.0
Fords Ferry	80	13	47.6	4.37	T.
Frankfort	74	8	46.5	3.66	0.5
Georgetown	76	4	45.6	.....	.....
Greensburg	83	7	46.6	3.23	T.
Hopkinsville	79	13	49.0	5.98	T.
Irvington	77	8	46.4	3.77	0.4
Jackson	75	6	46.4	3.07	T.
Leitchfield	76	9	45.5	4.21	1.2
Loretto	80	3	47.0	3.08	T.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kentucky—Cont'd.	°	°	°	*Ins.*	*Ins.*
Manchester	80[d]	4[d]	48.1[d]	2.51	1.0
Marrowbone	76	9	46.0	3.82	0.5
Maysville	81	5	43.6	2.22	0.2
Mount Sterling	76[e]	22[e]	43.8[e]	2.29[e]	.....
Owensboro	79	12	48.1	5.14	T.
Owenton	72	4	41.6	3.63	0.7
Paducah *a*	.....	.....	.....	4.58	T.
Paducah *b*	80	15	48.2	3.83	T.
St. John	76	8	47.0	4.02	T.
Scott	74	3	42.8	2.36	0.6
Shelby City	79	4	44.2	3.56	T.
Shelbyville	79	7	46.0	4.72	3.1
Warfield	79	6	44.0	2.93	4.8
Williamsburg	76	8	49.0	4.45	T.
Louisiana.					
Abbeville	84	32	61.0	4.10	
Alexandria	83	26	57.2	4.10	
Amite	84	25	59.0	4.23	
Baton Rouge	84	29	58.4	3.92	
Burnside	85	28	59.6	4.02	
Calhoun	.....	24	.....	3.23	
Cheneyville	82	28	57.2	3.53	
Clinton	.....	.....	.....	3.62	
Como	82[g]	23[b]	55.3[g]	2.44	
Covington	86	27	57.4	3.79	
Donaldsonville	86	30	61.1	3.60	
Emilie	79	31	58.9	3.09	
Farmerville	.....	26	.....	2.25	
Franklin	84	30	59.4	2.80	
Grand Coteau	81	29	59.2	2.02	
Hammond	84	25	59.6	3.12	
Houma	83	32	61.8	2.10	
Jeanerette	85	29	61.0	2.25	
Jennings	84	30	58.4	2.24	
Lafayette	82	29	58.1	3.81	
Lake Charles	86	31	58.7	3.27	
Lake Providence	83	22	57.8	6.22	
L'Argent	81	25	56.3	2.10	
Lawrence	81	34	58.8	4.33	
Libertyhill	85	24	57.6	2.89	
Mansfield	84	25	55.4	3.10	
Melville	84	26	57.9	4.10	
Minden [g]	82	26	54.2	3.11	
Monroe	83	26	57.5	3.11	
New Iberia	79	32	60.0	5.38	
Oakridge	84	22	55.6	6.15	
Opelousas	85	31	58.0	3.82	
Oxford	83	23	56.2	3.28	
Paincourtville	85	30	59.8	2.39	
Plain Dealing	86	19	54.4	2.79	
Prevost	.....	.....	.....	3.07	
Rayne	87	29	60.8	4.15	
Reserve	85	30	56.4	2.10	
Robeline	84	25	57.8	3.45	
Ruston	83	25	56.4	2.84	
Schriever	85	28	58.5	3.60	
Southern University	79	.....	.....	4.41	
Sugar Ex. Station	80	30	58.8	3.13	
Suga. town	80	30	59.6	4.63	
Venice	80[d]	35[d]	59.2[d]	5.88	
Wallace	84	31	60.6	2.96	
White Sulphur Springs	.....	.....	.....	3.27	
Maine.					
Bar Harbor	51	− 2	30.2	10.30	11.0
Belfast *[6]	47	− 2	28.3	7.80	10.5
Bemis	44[c]	− 9[d]	21.9[d]	5.90	15.0
Calais	43	− 9	25.3	5.29	28.2
Carmel	52	−13	29.5	3.75	7.0
Cornish	51	− 1	30.3	5.70	16.2
Fairfield	50	−14	29.2	5.22	4.0
Farmington	48	−18	27.3	4.54	12.0
Flagstaff	53	−22	23.2	2.75	20.0
Gardiner	49	− 7	29.8	6.25	13.0
Kineo	44	−20	19.4	1.45	10.5
Lewiston	50	− 5	29.8	5.14	13.4
Mayfield	53	−10	26.6	5.55	11.0
North Bridgton	51	− 8	28.6	4.80	15.0
Orono	49	−13	27.5	5.45	11.8
Rumford Falls	47	−13	26.0	4.05	12.5
Winslow	50	−11	29.0	5.15	0.5
Maryland.					
Annapolis	70	11	43.8	3.76	0.1
Bachmans Valley	70	8	40.3	6.99	T.
Boettcherville	80	3	41.4	3.53	3.0
Boonsboro *a*	75	5	43.4	3.60	
Charlotte Hall	78	18	45.8	2.40	T.
Chase	67	8	39.5	4.81	
Chestertown	70	14	43.6	2.67	T.
Chewsville	72	10	42.8	3.92	
Clearspring	74	5	40.0	.....	2.0
Coleman	.....	.....	.....	3.44	T.
Collegepark	76	6	44.2	3.53	T.
Cumberland *b*	.....	.....	.....	2.78	
Darlington	72	9	42.0	4.21	
Deerpark	69	− 6	36.4	2.03	7.5
Denton	72	11	44.9	2.97	1.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Easton	77	14	44.6	2.19	.....
Fallston	72	10	42.0	4.68	0.2
Frederick	73	10	45.3	4.34	
Frostburg	69	3	38.7	4.26	7.0
Grantsville	68	− 5	36.4	4.99	8.0
Greatfalls	74	7	42.5	2.95	.....
Greenspring Furnace	71	6	41.2	3.71	1.3
Hagerstown	74	6	43.1	4.06	.....
Hancock	77	1	41.0	3.28	2.2
Harney	.....	.....	.....	5.20	0.5
Jewell	75	11	45.0	3.52	T.
Johns Hopkins Hospital	70	8	41.5	1.13	.....
Laurel	77	7	43.6	3.50	T.
McDonogh	72	8	39.8	1.90	
Mount St. Marys Coll	71	7	42.0	5.40	2.0
Newmarket	74	8	42.6	3.15	T.
Pocomoke	72	13	47.2	3.83	0.8
Prince Fredericktown	74	9	45.4	3.83	1.0
Princess Anne	74	10	45.9	4.18	2.0
Rockhall *b*	73	12	44.4	1.75	T.
Sharpsburg	81	8	45.5	3.75	T.
Solomons	73	15	45.0	3.06	1.0
Sudlersville	78	11	44.8	2.68	
Sunnyside	76	− 9	36.2	4.93	17.8
Takoma Park	77	10	43.4	3.32	
Taneytown	75	9	41.8	4.42	1.0
Van Bibber	69	11	41.7	4.54	.....
Westernport	70	3	37.5	3.24	2.8
Westminster	73	7	41.6	3.56	T.
Woodstock	73	10	45.0	1.91	T.
Massachusetts.					
Attleboro	.....	.....	.....	8.44	.....
Bedford	56	5	34.6	5.10	3.0
Bluehill (summit)	56	4	33.2	7.36	0.9
Cambridge	59	6	35.7	6.74	.....
Chestnuthill	58	5	36.0	7.25	T.
Cohasset	.....	.....	.....	6.60	.....
Concord	57	3	33.8	3.89	1.3
East Templeton *[1]	52	1	30.6	3.47	9.0
Fallriver	55	10	37.2	7.34	0.5
Fitchburg *a* *[1]	50	4	32.2	5.06	9.0
Fitchburg *b*	52	1	32.3	4.98	7.0
Framingham	53	3	35.2	6.41	.....
Groton	52	1	32.5	5.41	5.5
Hyannis	.....	.....	.....	6.86	1.0
Jefferson	.....	.....	.....	6.02	6.2
Lawrence	57	8	34.0	4.98	3.0
Leeds	54	− 8	32.2	6.14	6.5
Leominster	.....	.....	.....	5.43	8.0
Lowell *a*	55	5	35.1	5.76	.....
Lowell *b*	57	3	34.9	.....	.....
Ludlow Center	50	− 4	29.6	6.00	.....
Middleboro	57	2	35.3	7.38	0.4
Monson	55	4	35.1	5.96	2.5
New Bedford *a*	58	10	36.8	7.85	1.5
Pittsfield	47	− 6	30.0	4.96	6.0
Plymouth *[1]	57	10	38.3	6.84	.....
Princeton	.....	.....	.....	5.00	6.5
Provincetown	55	11	36.0	5.40	1.0
Salem	.....	.....	.....	6.56	1.8
Somerset *[1]	58	7	37.6	7.58	0.2
Springfield Armory	56	5	34.6	5.92	3.0
Sterling	.....	.....	.....	5.79	3.5
Taunton	56	3	35.0	8.92	.....
Webster	.....	.....	.....	6.53	.....
Westboro	56	10	36.2	5.77	1.0
Weston	56	5	35.6	6.30	1.2
Williamstown	49	4	30.6	4.58	8.7
Winchendon	.....	.....	.....	4.78	6.0
Worcester	54	4	34.0	5.33	2.0
Michigan.					
Adrian	72	0	33.6	2.37	2.5
Agricultural College	68	− 5	31.1	2.94	5.7
Allegan	57	− 3	30.4	2.05	7.0
Alma	59	− 5	30.4	3.34	8.5
Ann Arbor	70	− 1	31.3	1.74	5.6
Annpere	69	1	32.9	1.17	6.7
Arbela	63	− 5	30.6	2.06	3.0
Baldwin	49	−14	27.0	0.95	5.5
Ball Mountain	65	− 6	31.0	2.60	3.9
Baraga	42	1	16.8	.....	.....
Battlecreek	68	0	33.2	3.12	1.8
Bay City	57	0	29.2	3.25	3.0
Benzonia	55	− 3	27.4	5.23	20.3
Berlin	62	− 4	31.0	2.37	5.1
Berrien Springs	69	2	34.6	4.83	17.0
Big Point Sable *[10]	60	0	29.5	.....	.....
Big Rapids	53	− 6	26.6	5.17	9.0
Birmingham	61	− 3	32.0	2.35	8.5
Boon	50	−13	23.6	4.69	21.4
Calumet	45	−11	21.8	2.32	18.5
Carsonville	60	− 7	29.3	0.73	3.0
Cassopolis	64	0	32.7	3.59	2.5
Charlevoix	48	− 5	24.9	5.32	26.2
Chatham	45	0	23.0	2.75	27.5
Cheboygan	45	−10	24.7	2.70	22.0

TABLE II.—*Climatological record of voluntary and other cooperating observers.*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Michigan—Cont'd.					
Clinton	71	−1	34.2	1.76	16.0
Coldwater	69	−1	34.1	2.71	6.0
Deerpark	44	−8	22.2	3.85	27.4
Detour	42	−10	23.2	2.63	25.0
Dundee	70	−2	35.0	2.13	T.
Eagle Harbor [f]	39	−10	22.6	0.68	6.7
East Tawas	48	4	31.8	3.28	19.5
Eloise	67	−1	34.0	2.61	3.0
Ewen	49	−16	22.1	1.20	12.0
Fairview	64	−2	30.4	1.27	2.7
Fitchburg	69	−4	31.4	2.63	6.0
Flint	66	−4	30.6	1.52	1.5
Frankfort	40			1.50	12.0
Gaylord	49	−8	22.2	2.95	23.0
Gladwin	53	−8	27.4	3.55	9.5
Grand Rapids	62	0	32.4	3.64	5.5
Grape	71	0	33.2	2.22	3.7
Grayling	51	−18	23.6	2.70	27.0
Hanover	70	−2	33.0	3.23	3.6
Harbor Beach	52	−6	28.4	1.75	6.0
Harrison [e]	49	−9	26.2	2.86	21.6
Harrisville	51	−10	25.8	4.44	16.9
Hart	54	2	29.4	5.13	6.5
Hastings	63	−5	32.6	3.31	5.5
Hayes	60	−5	28.2	1.78	8.0
Highland Station				2.40	6.0
Hillsdale	69	−2	33.4	2.95	4.0
Humboldt	45	−20	16.5	1.01	9.0
Ionia	59	−7	31.0	2.23	1.5
Iron River	41	−14	18.6	3.25	28.0
Ishpeming	44	−14	19.0	2.90	29.0
Ivan	53	−13	24.6	1.53	8.5
Jackson	69	−1	33.7	2.27	4.0
Jeddo	63	−3	30.6	1.80	3.5
Kalamazoo	63	1	34.8	1.91	1.0
Lake City	49	−20	25.0	2.70	27.0
Lansing	68	−3	31.4	2.97	8.2
Lapeer	64	−6	30.9		
Lathrop	46	−14	21.2	3.80	33.5
Lincoln	45	−11	24.7	3.98	27.0
Ludington	54	−5	30.8	2.25	5.0
Mackinac Island	42	−10	23.2	3.15	25.0
Mackinaw	50	1	30.4	2.82	19.0
Madison	70	0	33.7	2.36	4.3
Mancelona	52	−6	25.0	2.85	26.5
Manistee	52	−2	27.8	4.40	21.0
Manistique	45	−10	24.4	3.33	17.5
Menominee	48	−7	26.6	3.45	29.5
Mount Clemens	62	0	33.0	0.73	
Mount Pleasant	50	−5	29.2	2.54	7.7
Muskegon	58	1	30.8	3.20	5.0
Newberry	55	−4	24.6	1.40	13.0
North Marshall	68	−2	32.2	2.35	0.5
Northport	55	2	28.2	2.20	18.0
Old Mission	57	−1	26.8	3.21	18.5
Olivet	65	−1	31.8	2.78	1.9
Omer	53	−11	26.0	3.40	6.0
Onaway	51	−14	24.6	2.51	14.5
Ontonagon	34	−10	17.3	1.80	18.0
Ovid	66	−4	30.8	3.03	3.0
Owosso	68	−6	32.0	2.35	1.0
Petoskey	52	−2	23.7	2.95	23.5
Port Austin	53	4	28.4	1.44	3.5
Powers	46	−14	23.9	2.35	23.5
Reed City	47	−10	26.0	2.88	19.0
Roscommon	50	−2	25.2	5.30	6.0
Saginaw	61	−5	31.2	3.54	6.7
St. Ignace	48	−15	22.4	2.20	19.0
St. Johns	62	−5	31.9		
St. Joseph	64	4	34.8	3.24	1.0
Sidnaw	40	−15	18.4	2.80	26.0
Somerset	70	−3	31.8	2.08	2.0
South Haven	61	0	32.0	2.97	1.0
Stanton	55	−8	27.8	2.18	4.0
Thomaston	48	−15	19.6	1.15	11.5
Thornville	61	−5	31.2	0.99	6.0
Traverse City	54	−2	27.2	3.12	30.0
Vassar	64	−6	30.8	1.78	3.2
Wasepi	68	0	33.1	3.89	4.5
Waverly	64	−2	30.8	2.80	2.4
West Branch	50	−18	25.6	2.83	19.0
Wetmore	42[d]	−12[d]	21.0[d]	1.50	15.0
Whitecloud	54	−7	28.6	0.90	9.0
Whitefish Point	38	−12	20.5	2.70	17.8
Williamston	70	−4	32.8	2.05	
Ypsilanti	70	−2	32.6	3.30	3.5
Minnesota.					
Ada	52	−10	25.2	1.16	7.0
Alexandria	50	−10	27.1	1.01	7.0
Ashby	50	−8	27.8	1.84	10.2
Beardsley	65	−11	29.5	1.93	5.0
Beaulieu	53	−16	27.8	0.75	T.
Bemidji	49	−15	24.4	2.76	7.1
Bird Island	58	−7*	30.5	0.92	5.5
Blooming Prairie	49	−7	29.2	2.30	20.5
Brainerd	48	−18	24.4	1.70	6.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Minnesota—Cont'd.					
Caledonia	49	−8	28.8	2.04	15.0
Collegeville	50	−8	28.1	1.52	14.0
Crookston	47	−12	21.7	0.20	2.0
Currie	60	−5	29.3		
Deephaven				1.76	13.0
Detroit City	50	−12	25.6	1.38	7.0
Faribault	55[c]	−9	29.8[d]	0.80	11.3
Farmington	54	−13	29.0	1.58	12.0
Fergus Falls	50	−9	27.5	1.50	7.2
Glencoe	56	−2	28.4	0.59	
Grand Meadow	56	−9	27.4	4.17	26.0
Hallock	43	−16	21.5	1.19	3.0
Hovland				1.84	18.0
Lake Jennie	52	−7	28.8	2.06	12.0
Lakeside	54	−8	29.3	1.40	11.5
Lake Winnibigoshish	50	−20	21.8	2.36	17.8
Leech	50	−18	22.4	3.24	15.0
Leroy	52	−10	28.0	2.90	
Long Prairie	50	−11	26.4	2.03	10.8
Luverne	65	−2	33.1	1.10	6.0
Lynd	60	−7[f]	30.7[c]	0.86	6.1
Mapleplain	52	−9	28.0	2.28	18.3
Milan	60	−7	30.5	1.07	4.5
Minneapolis *a*	53	−8	26.8	1.93	13.7
Minneapolis *b* [1]	52*	−8	28.5	1.89	16.4
Montevideo	57	−7	29.7	1.36	5.9
Morris	54	−8	28.6	0.82	5.6
Mount Iron	50	−20	21.5	3.20	20.5
Newfolden	41	−28	19.6	0.35	2.9
New London	50	−10	27.4	1.11	7.5
New Richland *[1]	52	−6	31.4		
New Ulm	61	−5	29.4	1.33	9.0
Park Rapids	50	−15	23.2	1.98	16.0
Pine River	49	−16	23.2	1.43	14.4
Pipestone	60	−10	29.9	0.33	1.9
Pleasant Mounds	58	5	31.3	0.89	9.0
Pokegama Falls	50	−28	18.4	4.11	24.5
Redwing *a*				1.79	10.5
Redwing *b*	52	−7	31.5	1.19	9.5
Reeds				1.63	22.5
Rolling Green	58	−5	29.6	1.77	14.0
St. Charles	52	−8	29.0	1.30	9.0
St. Cloud	65	−8	31.6	1.34	7.0
St. Peter	60	−7	30.8	0.87	5.0
Sandy Lake Dam	51	−17	22.6	2.12	19.8
Shakopee	54	−6	30.1	1.66	13.0
Thief River Falls				0.90	8.0
Tower	47	−25	22.2	2.80	28.0
Two Harbors	51	−16	22.6	2.10	16.0
Wabasha *[3]		−7	27.3	2.38	21.0
Warroad	49	−19	18.6	0.63	6.0
White Bear				2.27	19.7
Willmar	53	−7	28.9	0.87	3.5
Willow River	50	−14	24.4	2.39	22.0
Winnebago City	57	−6	29.2	1.51	10.5
Worthington	55	−5	31.0	1.76	7.0
Zumbrota [1]	54*	−13	29.4		
Mississippi.					
Agricultural College	80	21	54.1	3.29	T.
Batesville	81	19	53.0	5.33	
Bay St. Louis	76	32	58.7	3.49	
Biloxi	78	32	59.6	4.37	
Booneville	75	18	49.0	5.03	
Brookhaven	84	20	57.4	4.60	
Canton	80	25	55.8	3.23	
Cleveland				3.16	
Columbus *b*	77	24	53.0	5.58	
Crystalsprings	81	24	54.8	3.88	
Edwards	81	26	57.9	3.45	
Fayette [b]	78	26	54.6	4.40	
Fayette (near)*[1]	80	30	58.8	3.17	
Greenville *a*	77	27	55.7	4.45	
Greenville *b*	79	24	53.9	4.66	
Hernando	79	18	52.0	3.20	
Holly Springs	79	18	49.0	3.61	T.
Jackson	82	26	55.4	2.76	
Kosciusko	80	21	56.3	2.90	
Lake	79	20	50.9		
Leakesville [c]	79	21	57.4	3.57	
Louisville	80	20	55.0	2.17	T.
Macon	79	25	53.6	2.67	
Magnolia	81	24	57.6	4.89	
Natchez	83	28	59.9	3.70	
Okolona	79	20	51.6	1.55	
Palo Alto	81	22	54.0	3.76	T.
Pearlington	82	28	58.8	3.18	
Pontotoc	79	18	52.8	4.46	T.
Poplarville	84	27	59.0	3.33	
Port Gibson	83	23	57.8	3.22	
Ripley	77	16	49.8	5.46	T.
Saratoga	80	21	53.7	2.40	
Shoccoe				2.10	
Stonington *[1]	80	28	57.4	3.64	
Suffolk				3.97	
Thornton	80	28	54.6	3.52	
Tupelo				5.10	

Stations	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Mississippi—Cont'd.					
Walnutgrove	83	23	56.6	2.01	
Watervalley	83			3.85	T.
Waynesboro	80	22	55.7	3.97	
Woodville	80	28	58.2	5.60	
Yazoo City	81	25	55.5	4.55	
Missouri.					
Appleton City	78	11	43.7	3.97	5.6
Arthur	78	9	44.6	3.82	T
Avalon	70	10	42.2	3.07	2.2
Bagnell				5.25	
Bethany	70	11	38.8	2.97	3.6
Birchtree	79	11	46.5	3.72	
Boonville				6.28	3.9
Brunswick	70	13	39.4	3.67	T.
Carrollton	71	13	40.5	2.27	2.0
Conception	70	5	37.4	3.39	14.0
Cook Station	80	9	44.6	2.00	T.
Cowgill *[5]	64	17	38.6	4.30	
Darksville	69	14	37.7	3.10	0.5
Downing				2.76	1.8
Edgehill *[5]	68	8	42.2	3.32	2.0
Edwards	80	15	46.6	4.37	1.0
Eightmile *[5]		9	38.8	3.54	6.4
Eldon	80	12	44.2	3.79	1.0
Fairport				2.98	3.7
Fayette	73	13	41.0	4.10	4.2
Fulton	73	14	43.6	3.97	1.0
Galena				3.61	T.
Gallatin *[1]	70	13	40.1	2.98	5.0
Gayoso	76	15	49.7	4.14	T
Glasgow	72	14	40.6	4.15	6.0
Gorin				3.27	T
Halfway	80	7	44.4	4.59	3.0
Harrisonville	80	10	40.4	3.72	5.2
Hazlehurst				1.96	6.5
Hermann				2.71	
Houston	80	9	45.2	3.76	T.
Irena				4.05	14.0
Ironton	80	11	44.9	4.93	0.9
Jackson				4.08	2.2
Kidder	72	11	39.2	3.34	7.2
Koshkonong	81	11	47.8	4.55	T.
Lamar	82	11	45.6	4.90	2.0
Lamonte				3.96	2.0
Lebanon	79	10	44.6	4.00	T.
Lexington	76	12	43.0	4.41	8.0
Liberty	79	10	40.8	2.76	5.4
Louisiana	75	13	43.6	3.73	1.0
McCune *[1]	73	13	41.8	4.43	7.5
Macon	73	8	41.2	4.57	2.5
Marblehill	76	10[f]	45.6[c]	3.81	T.
Marshall	72	13	42.2	4.35	0.5
Maryville	72	11	36.4	4.18	20.5
Mexico	74	4	41.4	3.11	1.8
Miami *[5]	70	14	40.2	3.57	T.
Mineralspring	79	11	45.6	4.11	1.5
Montreal	80	10	45.2	3.33	T.
Mount Vernon	81	12	45.7	6.13	4.0
Neosho	82	6	46.6	4.54	2.0
Nevada				3.45	2.0
New Haven	75	14	44.7	3.46	T.
New Madrid				3.79	
New Palestine	74	16	44.6	3.96	T.
Oakfield	74	12	44.2	3.02	3.6
Olden	79	10	46.1	3.76	T.
Oregon *a*	78	12	39.6	4.62	10.8
Palmyra *[5]	70	14	40.0	2.31	1.8
Phillipsburg *[1]	74	9	42.4	4.00	1.0
Pine Hill				4.48	T.
Poplarbluff	80	11	49.4	4.80	T.
Potosi	79	−1	40.8	3.98	1.0
Richmond	75	15	41.2	3.85	8.0
Rockport				2.60	18.5
Rolla				3.32	1.1
St. Charles	72	12	43.8	3.31	2.2
St. Joseph				3.30	3.0
Sarcoxie *[5]		12	40.7	2.65	2.3
Seymour	79	9	44.3	4.03	T.
Shelbina				2.76	0.2
Sikeston	75	13	47.8	4.50	
Steffenville	72	11	40.8	4.41	2.5
Sublett	71	9	37.8	3.41	2.2
Trenton	68	13	40.2	2.93	7.8
Unionville	72	8	38.4	2.53	7.0
Warrensburg	79	11	43.4	4.62	4.0
Warrenton	75	11	40.4	3.96	4.0
Wheatland				5.42	1.0
Willowsprings	77	14	44.6	3.39	T.
Windsor	78	11	43.2	5.39	2.2
Wylie	85	6	47.2	3.79	2.0
Zeitonia	81	9	44.6	4.27	T.
Montana.					
Adel	57	−10	32.8	1.45	14.5
Anaconda	60	0	33.1	0.49	5.5
Augusta	62	−10	35.2	0.26	6.0
Bigtimber	61[c]	−8[c]	34.2[c]	0.40	3.8

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Billings	69	3	35.0		
Boulder	59	−3	32.7	0.21	2.8
Bozeman	60	−2	32.5	1.21	18.5
Butte	58	−6	30.2	1.65	16.5
Canyon Ferry	64	0	36.0	0.81	
Chester	62	−20	32.8	0.10	1.0
Chinook	70	−2	35.7	0.23	2.3
Clemons	58	−11	34.4	0.90	9.0
Columbia Falls	60	10	36.4	2.69	7.0
Corvallis	56	16	38.0	0.05	0.5
Crow Agency	70	5	39.0	1.00	10.0
Culbertson				0.12	T.
Dell	56	8	29.6	0.56	5.6
Dillon	63	−2	35.0	0.96	9.1
Fort Benton	62	14	37.2	0.40	4.0
Fort Logan	59	−5	32.4	0.72	
Glasgow	66	−5	33.4	T.	T.
Glendive	67	−2	33.6	0.81	5.0
Glenwood	60	−3	31.8	2.15	21.5
Greatfalls	62	−1	37.7	0.33	3.2
Kipp	61	−10	32.8	0.84	8.1
Manhattan	68	−5	34.8	0.70	7.0
Martinsdale	66	−4	32.8	1.10	11.0
Marysville	54	−7	30.6	1.20	12.0
Missoula	62	11	38.3	1.41	11.5
Ovando	52	−14	26.5	1.98	15.8
Parrot	62	2	34.8	0.28	2.4
Plains	68	16	37.9	0.65	3.0
Poplar	62	−5	32.2	T.	T.
Ridgelawn	66	−5	32.6	T.	T.
St. Pauls	60	−10	35.4	0.20	1.0
Troy	68	18	39.2	1.08	2.0
Twin Bridges	64	4	32.1		
Utica		−15		0.57	5.5
Wibaux	64	−7	31.0	0.30	1.0
Yale	68	−3	36.0	1.10	11.0
Nebraska.					
Agate				1.20	12.0
Agee *1	86	0	32.0	0.89	
Albion	79	3	35.9	1.84	10.0
Alliance				0.95	8.5
Alma	82	6	39.8	3.57	14.0
Ansley	80	0	35.5	3.46	12.2
Arapaho *1	81	9	39.2	2.40	7.0
Arborville *1	72	10	33.6	2.42	13.0
Arcadia				3.30	10.5
Arlington				2.02	10.0
Ashland *a*	79	9	37.9	1.56	13.0
Ashland *b* *1	78	11	35.2	1.85	13.0
Ashton				2.88	9.0
Auburn	79	12	39.3	1.90	16.7
Aurora	77	4	36.2	2.18	8.8
Bartley				1.30	10.0
Beatrice	76	7	37.8	2.18	12.5
Beaver	87	6	40.1	2.46	12.0
Bellevue				2.27	13.1
Benedict				3.18	20.0
Benkleman				4.25	20.5
Blair	76	9	35.6	1.97	15.7
Bluehill				1.72	10.5
Bradshaw				2.57	12.0
Brokenbow *1	72	8	33.6	1.88	7.5
Burchard				1.35	11.0
Burwell				1.81	8.5
Callaway	78	5	37.6	3.13	19.0
Camp Clarke	71	8	36.0	1.25	12.5
Central City				2.40	12.0
Chester				1.33	9.0
Cody				1.20	12.0
Columbus	75	8	37.1	0.83	
Crete	79	10	37.1	1.53	10.0
Culbertson				3.23	19.6
Curtis	80[d]	8[d]	38.0[d]	4.27	23.5
David City	84	7	35.8	3.10	13.0
Dawson	82	10	40.0	2.08	7.2
Eden				2.27	12.0
Edgar *a* *5	76	12	38.9	0.79	5.4
Ericson				1.63	6.0
Ewing				1.77	4.5
Fairbury	80	9	37.6	1.22	5.0
Fairfield				2.45	12.0
Fairmont	77	10	34.9	2.90	17.0
Fort Robinson	68	2	33.6	1.40	13.2
Franklin	81	5	37.2	1.58	8.0
Fremont	78	8	36.8	2.41	13.0
Fullerton				2.17	6.0
Geneva	73	9	36.5	1.45	9.3
Genoa	75	8	36.5	1.05	7.4
Gering	69	10	35.4	0.76	5.1
Gordon				0.90	9.0
Gosper				2.46	13.0
Gothenburg	80[e]	2[e]	29.0[e]	2.70	14.0
Grand Island *b*	79	10	36.4	2.77	14.3
Greeley				1.05	5.5
Haigler				1.55	15.5
Hartington	75	0	33.4	2.18	15.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nebraska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Harvard	74	8	36.3	1.68	10.0
Hastings *1	74	10	36.4	0.95	12.5
Hayes Center				2.35	24.5
Hay Springs	65	0	34.0	2.09	17.9
Hebron	80	8	38.2	1.47	8.0
Hickman				1.60	10.0
Holdrege	79	13	38.8	4.25	26.5
Hooper *1	70	9	35.0	1.45	11.1
Imperial	79	−3	36.5	2.43	
Johnstown				1.76	11.5
Kearney				2.15	11.0
Kennedy	73	0	35.2	1.45	14.5
Kimball	68	6	33.2	1.90	19.0
Kirkwood *1	73	5	31.8	1.02	3.2
Laclede				2.46	9.5
Lena				2.61	10.4
Lexington	81	1	36.0	3.53	18.7
Lodgepole	73	0	34.7	2.80	28.0
Loup				2.49	10.0
Lynch	78	−8	34.9	0.97	3.0
McCook *1	75	10	34.7	1.75	16.0
McCool				2.10	8.0
Madison	75	6	35.6	1.80	11.5
Madrid				1.90	19.0
Marquette				2.50	10.0
Mason City				3.15	11.5
Merriman				0.85	8.5
Minden *a*	79	6	35.8	2.51	14.2
Monroe				1.32	6.5
Nebraska City *b*				2.10	18.0
Nebraska City *c*	76	11	38.5	1.91	
Nemaha *1	72	14	41.0	1.94	8.5
Nesbit	75	−2	34.1	1.64	15.0
Norfolk	78	4	35.1	1.49	10.0
North Loup	80	7	34.8	2.18	10.5
Oakdale	76	5	34.0	1.29	5.1
Odell				1.55	9.0
O'Neill	82	2	36.2	1.45	3.0
Ord				2.29	11.0
Osceola				1.75	9.0
Ough				1.00	20.0
Palmer				1.90	7.5
Palmyra *1	78	10	35.2	2.38	18.5
Plattsmouth *a*				2.99	25.0
Plattsmouth *b*				2.84	21.0
Pleasanthill				1.19	11.9
Ravenna *a*	77	8	37.0	3.42	14.5
Ravenna *b*				2.92	10.0
Redcloud *b* *1	76	10	38.4	2.48	9.0
Republican				1.76	8.0
St. Libory				2.37	10.2
St. Paul	77	8	35.9	2.14	8.5
Salem *1	74	14	39.5	1.90	7.0
Santee	79	0	36.5	0.62	3.2
Schuyler				1.28	7.0
Seneca *1	70	8	30.8	0.65	6.5
Seward				2.88	12.5
Smithfield				2.86	16.0
Spragg				0.80	6.0
Springview	73	1	34.4	1.19	4.0
Stanton *1	71	4	31.8	1.71	9.5
State Farm	80	10	37.8	1.59	9.0
Strang				1.10	8.5
Stratton				4.46	27.0
Superior *5	77	12	37.0	1.75	9.0
Syracuse				2.09	16.0
Tablerock				2.85	15.0
Tecumseh *b*	75	11	37.8	1.30	10.0
Tecumseh *c*				1.89	12.5
Tekamah	76	7	37.2	2.55	16.0
Turlington	77	8	37.0	2.34	19.0
Wakefield	76	2	34.8	1.53	8.4
Wallace				2.25	22.5
Wauneta				2.25	22.5
Weeping Water				2.82	20.0
Westpoint	78	7	37.4	1.95	15.0
Whitman				0.40	4.0
Wilber *1	76	12	37.8	1.20	9.5
Willard				1.01	
Wilsonville *1	78	15	38.8	3.87	29.0
Winnebago				2.35	15.7
Wisner				1.66	8.3
Wymore				0.92	6.5
York				1.59	4.0
Nevada.					
Amos	66	15	40.4	0.26	
Austin	60	10	35.4	0.49	
Battle Mountain *1	60	23	37.6	0.00	
Belmont	56	10	33.8	0.06	T.
Beowawe *1	71	30	43.9	0.13	1.3
Candelaria	78	16	42.6	0.34	3.4
Carlin *1	62	20	40.0	0.50	5.0
Carson City	74	20	41.6	0.61	4.6
Cranes Ranch				0.69	
Elko (near)	61	20	41.6	0.34	3.3
Ely	62	10	34.0	0.60	5.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Nevada—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fenelon				0.90	9.0
Glenbrook				1.23	12.3
Golconda *1	68	22	42.3	T.	T.
Halleck *1	63	18	35.5	0.10	1.0
Hamilton	57	7	30.8	0.70	7.0
Hawthorne	70	14	43.8	0.05	0.5
Hot Springs *1	71	22	43.7	T.	T.
Humboldt *1	67	26	42.7	0.00	
Lee				2.52	12.0
Lewers Ranch	70	18	41.6	1.96	15.5
Lovelocks *1	90	27	44.8	0.00	
Mill City				T.	T.
Monitor Mill	61	5	32.1	0.33	4.0
Owyhee	63	9	35.4	0.98	7.9
Palisade *1	65	20	37.5	0.39	3.0
Potts	62	0	34.4	0.56	6.2
Reno State University	65	20	39.2	0.39	3.1
Sodaville	72	21	43.8	0.20	1.0
Tecoma				0.50	5.0
Toano *5	60	10	36.2	0.50	5.0
Tybo	62	15	37.6	0.20	2.0
Verdi *1	58	12	40.0	0.60	6.0
Wadsworth *1	70	20	47.8	0.00	
Wells *1	60	20	37.2	1.10	8.0
Wood	62	7	33.4	1.79	4.0
New Hampshire.					
Alstead				4.64	13.5
Berlin Mills	49	−21	24.6	3.24	22.8
Bethlehem	51	−5	27.8	3.80	19.0
Brookline *1	54	−2	33.2	5.73	8.5
Claremont	53	−2	31.4	5.10	8.0
Concord	52	−6	31.4	4.05	4.7
Durham	54	1	31.6	5.38	5.5
Grafton	48	−15	27.0	3.62	7.0
Hanover	49	−7	28.2	3.71	5.6
Keene	59	−5	31.6	4.61	12.4
Littleton	50	−7	27.1	3.68	9.0
Nashua	57	2	33.8	4.42	5.5
Newton	54	1	33.6	5.43	2.5
Peterboro	51	−1	30.4	5.07	6.2
Plymouth	47	−12	27.8	4.30	9.8
Sanbornton	53	−7	28.6	3.00	11.0
Stratford	55	−17	25.8	3.21	23.0
New Jersey.					
Asbury Park	57	10	38.9	4.20	T.
Bayonne	57	11	38.8	5.17	T.
Belvidere	60	6	37.8	5.31	3.0
Bergen Point	57	13	38.9	6.34	
Beverly	64	10	41.6	4.14	T.
Billingsport *1	64	14	40.5	3.75	
Blairstown	59	1	35.8	4.45	0.4
Bridgeton	75	11	43.8	3.51	T.
Camden	62	12	41.7	3.36	0.1
Cape May C. H.	70	10	42.0	8.54	0.2
Charlotteburg	55	−3	35.4	8.07	4.0
Chester	55	5	34.6	5.56	7.0
Clayton	72	9	42.0	3.21	T.
College Farm	59	10	39.2	5.19	
Deckertown	56	0	36.2	5.17	1.5
Dover	57	6	34.7	5.80	2.5
Egg Harbor City	72	1	41.4	3.42	2.0
Elizabeth	60	10	39.0	5.82	T.
Flemington	60	9	39.6	5.59	T.
Freehold	58	8	39.6	6.23	T.
Friesburg	72	11	42.4	2.85	0.4
Hammonton				3.60	
Hanover	55	7	37.6	5.46	2.3
Hightstown	60	12	40.5	4.24	
Imlaystown	63	9	42.0	3.55	0.2
Lambertville	60	7	40.0	6.00	1.2
Layton	57	−8	34.0	5.65	2.8
Moorestown	64	10	41.6	4.35	0.2
Newark	58	9	37.2	4.70	T.
New Brunswick	62	9	40.2	5.37	T.
Newton	56	2	35.2	4.71	
Ocean City	63	12	39.8	3.87	
Oceanic	54	8	39.1	4.93	T.
Paterson	61	11	39.4	6.13	2.5
Perth Amboy	59	11	39.1	4.61	
Plainfield	59	8	37.8	5.20	T.
Rancocas				3.95	T.
Rivervale	56	4	37.2	6.12	2.5
Roseland	58	7	36.3	5.17	3.5
Salem	75	13	42.8	2.76	0.5
Somerville	60	8	39.4	5.42	T.
South Orange	57	9	36.9	3.92	T.
Toms River	64	4	39.2	3.91	T.
Trenton	58	12	40.9	4.76	T.
Tuckerton	70	−1	39.5	4.61	2.5
Vineland	72	10	42.7	3.16	0.2
New Mexico.					
Albert	83	18	45.8	0.25	2.0
Albuquerque	72	22	45.6	0.15	1.5
Alma	78	17	44.4	0.92	1.5
Bellranch				0.40	2.0
Bernalillo	78[f]	20[h]	45.4[g]	0.40	1.5

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New Mexico—Cont'd.	°	°	°	Ins.	Ins.
Bluewater	65	9	36.8	0.40	4.0
Cambray	.....	.....	.....	0.08	
Deming	.....	.....	.....	0.11	
East Lasvegas	65	20	38.6	0.14	1.8
Engle	78	18	46.4	0.35	
Espanola	74	12	40.6	0.10	T.
Folsom	73	11	36.0	1.83	18.3
Fort Bayard	71	20	44.6	0.60	4.0
Fort Union	70	10	37.6	0.50	5.0
Fort Wingate	74	15	39.1	0.68	6.8
Gage	.....	.....	.....	0.11	
Galisteo	70	15	40.8	1.50	15.0
Gallinas Spring	76	17	44.0	0.22	2.1
Hillsboro	73	25	48.8	0.12	
Horse Springs	70	12	40.2	0.20	2.0
Las Vegas	71	12	39.4	0.14	1.0
Las Vegas Hotsprings	69	12	40.0	0.34	3.0
Lordsburg	.....	.....	.....	0.20	0.3
Los Lunas	74	23	45.7	0.30	
Mesilla Park	84	22	50.4	0.61	
Olio	68	13	40.2	T.	T.
Raton	70	12	37.4	1.15	11.5
Roswell	87	20	49.8	0.00	
San Marcial	90	20	53.0	0.00	
Socorro	78	17	47.8	0.01	T.
Springer	73	9	39.2	0.42	4.2
Strauss	.....	.....	.....	1.00	
Whiteoaks	68	19	44.0	0.67	6.0
Winsors Ranch	59	7	32.8	1.80	16.0
Woodbury	.....	.....	.....	0.64	5.8
New York.					
Adams	.....	.....	.....	3.87	59.0
Addison	60	−2	33.1	3.06	2.0
Akron	.....	.....	.....	2.97	.....
Alden	60	−6	32.6	3.09	13.4
Alfred	54	−8	30.4	1.24	1.6
Angelica	59	−6	30.8	2.95	T.
Appleton	59	0	31.0	2.14	.....
Atlanta	57	−5	29.7	2.60	6.2
Auburn	61	5	32.1	1.47	3.0
Avon	63	−3	32.0	2.14	2.6
Axton	51	−28	24.1	3.26	10.6
Bedford *a*	53	6	34.4	6.02	2.8
Blue Mountain Lake	.....	.....	.....	3.60	24.0
Bolivar	60	−8	30.4	2.90	5.7
Bouckville	53	−2	28.6	3.18	9.5
Boyds Corners	.....	.....	.....	7.24	.....
Brockport	59	−2	31.1	3.74	7.0
Caldwell	53	−4	29.5	4.75	8.0
Canaan Four Corners	48	−2	29.4	2.63	3.6
Canajoharie	51	2	30.5	1.95	3.0
Canton	53	−20	26.0	3.69	5.0
Carmel	55	4	34.9	7.89	7.0
Carvers Falls	50	−13	27.6	.....	.....
Catskill	52	5	33.2	.....	.....
Cedarhill	52	1	33.2	4.64	6.5
Cooperstown	56	−1	29.0	3.00	6.5
Cortland	.....	.....	.....	2.76	0.8
Cutchogue	53	12	37.0	7.79	T.
Dekalb Junction	.....	.....	.....	4.67	16.5
Easton	.....	.....	.....	3.93	7.5
Elba	58	−4	30.4	2.40	12.0
Elmira	63	0	35.4	2.84	2.0
Franklinville	60	−7	29.5	3.35	7.8
Fulton	.....	.....	.....	2.49	9.6
Gabriels	48	−15	24.0	2.79	12.5
Glens Falls	56	1	30.4	3.32	8.0
Gloversville	46	−9	27.6	2.78	7.0
Greenwich	54*c*	−2*c*	30.0*c*	5.00	11.5
Griffin Corners	51	−7	30.0	3.16	5.8
Haskinville	.....	.....	.....	1.86	1.0
Hemlock	55	−1	30.9	0.85	T.
Honeymead Brook	52	2	33.0	3.68	6.4
Honnedaga Lake	.....	.....	.....	3.89	23.0
Humphrey	59	−8	28.8	3.56	14.2
Indian Lake	52	−16	26.4	2.95	15.9
Ithaca	56	−1	31.6	2.89	4.4
Jamestown	62	−4	33.1	2.97	11.5
Jay	54	−12	30.1	0.94	4.5
Keene Valley	53	−14	27.6	2.18	7.0
King Ferry	.....	.....	.....	3.02	5.6
King Station	.....	.....	.....	3.97	14.0
Liberty	49	−4	29.8	3.24	10.0
Littlefalls, City Res.	46	0	27.8	2.69	10.5
Lockport	64	−2	33.4	1.80	6.0
Lowville	49	−13	26.8	1.58	6.2
Lyndonville	.....	.....	.....	1.66	.....
Mayle	.....	.....	.....	1.25	3.6
Meredith	56	−7	28.8	1.82	6.2
Middletown	52	−5	33.8	5.86	5.5
Mohonk Lake	64	1	32.1	6.03	6.8
Moira	52	−8	27.4	4.85	11.4
Newark Valley	.....	.....	.....	3.75	2.5
New Lisbon	60	−11	28.6	2.78	6.8
North Germantown	.....	.....	.....	5.89	.....
North Hammond	44	−2	28.0	4.78	17.7

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	Ins.	Ins.
North Lake	51	−19	21.9	3.04	.....
Nunda	61	−2	32.3	2.56	4.0
Ogdensburg	48	−5	25.7	2.53	3.4
Old Chatham	.....	.....	.....	4.44	11.3
Oneonta	64	0	33.2	2.41	4.7
Oxford	56	−8	30.6	3.70	8.5
Palermo	48	−8	27.8	2.18	.....
Penn Yan	60	−1	32.3	2.30	2.3
Perry City	56	−4	29.6	3.12	7.5
Plattsburg Barracks	44	0	22.9	1.85	.....
Port Byron	60	−1	30.7	3.16	4.5
Port Jervis	60	−1	34.8	5.19	2.0
Primrose	55	10	37.5	5.74	4.0
Redhook	.....	.....	.....	5.74	.....
Richmondville	55	0	30.5	2.09	3.5
Ridgeway	59	−1	30.2	2.61	4.3
Rome	.....	.....	.....	3.57	6.0
Romulus	58	1	32.4	2.14	1.0
Salisbury Mills	.....	.....	.....	5.76	.....
Saranac Lake	53	−18	26.1	2.41	15.7
Saratoga Springs	50	−4	30.6	3.80	5.5
Setauket	55	12	36.8	5.61	1.0
Shortsville	57	−1	31.3	1.26	3.2
Skaneateles	.....	.....	.....	3.67	.....
Southampton	51	11	36.7	5.78	T.
South Berlin *c*	53	−6	30.4	0.91	4.3
South Canisteo	58	−5	30.5	3.13	8.2
Southeast Reservoir	.....	.....	.....	6.99	.....
South Kortright	58	−2	28.8	3.64	8.5
South Schroon	.....	.....	.....	3.92	9.0
Straits Corners	56	−8	30.3	4.32	5.5
Ticonderoga	52*d*	−8*d*	29.2*d*	2.72	5.5
Volusia	61	−6	31.5	3.43	.....
Walton	60	−11	32.4	3.04	8.2
Wappingers Falls	62	4	36.5	6.22	7.0
Warwick	.....	.....	.....	4.47	.....
Watertown	55	−8	29.2	4.71	32.7
Waverly	58	−3	32.9	4.42	3.8
Wedgwood	54	−5	29.4	3.32	6.3
Wells	49	−16	27.1	4.76	9.9
West Chazy	45	−11	25.2	.....	.....
Westfield *a*	63	−1	34.4	1.86	2.0
Westfield *b*	62	−3	32.6	3.02	.....
Westfield *c*	64	1	34.1	2.57	3.6
Windham	51	−6	30.3	2.43	8.6
North Carolina.					
Abshers	74	10	46.8	6.22	T.
Asheville	.....	.....	.....	5.22	T.
Biltmore	74	5	48.0	4.86	T.
Bryson City	.....	.....	.....	6.59	T.
Chapelhill	75	13	50.6	3.72	
Cherryville	75	11	49.8	4.75	
Currituck	.....	.....	.....	2.05	
Durham	75	14	50.4	5.85	
Edenton	76	19	53.2	4.85	
Fayetteville	78	15	53.6	3.78	
Flatrock	73	5	46.4	8.62	T.
Goldsboro	77	17	52.0	2.21	
Greensboro	75	14	48.8	2.82	
Henderson	73	13	50.8	4.69	0.4
Hendersonville	73	8	46.4	6.55	T.
Henrietta	77	12	51.2	5.10	
Highlands	62	1	41.2	10.10	0.5
Horse Cove	68	5	45.1	10.14	0.4
Kinston	81	16	54.9	4.00	
Lenoir	75	8	45.5	6.84	
Linville	60	0	40.0	.....	
Littleton	73	12	49.0	3.73	T.
Louisburg	75	10	50.8	2.62	T.
Lumberton	77	18	51.1	3.56	
Marion	75	8	48.4	8.85	T.
Marshall	71	7	45.1	4.58	1.5
Mocksville	75*c*	12*c*	49.9*c*	3.86	
Moncure	76	17	52.4	3.47	
Monroe	75	10	49.9	5.00	
Morganton	73	15	49.0	6.00	
Mountairy	71	13	46.9	3.45	T.
Murphy	.....	.....	.....	6.65	0.3
Newbern	78	17	55.5	4.60	
Oakridge	74	13	48.4	4.02	T.
Patterson *[1]	70	10	44.5	7.54	T.
Pittsboro	78	10	51.4	3.77	
Rockingham	77	17	51.6	3.98	
Roxboro	73	14	52.4	3.83	
Salem	74	9	49.6	4.83	
Salisbury	77	16	51.0	5.22	
Saxon	76	7	49.6	3.78	T.
Selma	77	13	52.6	3.35	
Settle	74	14	50.8	4.35	
Sloan	79	14	54.6	5.29	
Soapstone Mount	73	6	48.2	4.08	T.
Southern Pines *a*	80	15	55.0	5.35	
Southern Pines *b*	75	16	53.5	4.01	
Southport	75	20	53.4	4.98	
Springhope *[1]	75	15	52.0	2.70	
Tarboro	78	13	53.6	3.02	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Carolina—Cont'd	°	°	°	Ins.	Ins.
Washington	77	19	55.7	5.30	
Waynesville	73	8	45.8	7.07	0.4
Weldon *a*	73	14	48.9	3.78	
Weldon *b*	.....	.....	.....	3.70	T.
North Dakota.					
Amenia	55	−11	26.1*c*	0.80	1.0
Ashley	65	−16	25.6	0.65	2.0
Berlin	68	−9	27.2	0.61	2.6
Bottineau	43	−16	21.6	0.93	9.3
Cando	50	−11	21.0	0.37	3.7
Coalharbor	60	−7	27.2	1.20	9.5
Devils Lake	43	−14	21.2	0.90	9.0
Dickinson	64	−5	30.0	0.70	6.0
Donnybrook	.....	.....	.....	0.37	3.7
Dunseith	44	−15	22.0	0.72	7.2
Ellendale	67	−7	30.2	1.05	6.0
Falconer	60	−6	28.6	0.85	5.5
Fargo	51	−9	25.2	1.31	8.8
Forman	67	−5	26.6	0.22	2.2
Fort Berthold	62	−5	30.9	0.35	2.0
Fullerton	66	−7	27.6	1.17	5.5
Gallatin	48	−10	23.4	0.69	3.3
Glenullin	65	−6	29.6	0.74	4.0
Grafton	47	−11	22.6	0.90	5.0
Hamilton	46	−13	21.6	0.81	3.9
Hannaford	47	−27	23.8	1.00	1.9
Jamestown	54	−15	25.4	0.72	3.0
Larimore	44	−12	22.0	0.92	4.0
McKinney	48	−19	22.1	0.45	4.5
Mayville	54	−10	26.4	1.04	5.0
Medora	66	−3	32.3	0.88	6.5
Melville	44	−8	24.6	1.48	8.8
Milton	39	−20	18.1	1.65	8.5
Minnewaukon	45	−16	22.0	0.44	4.4
Minto	46	−11*c*	23.4	0.81	3.1
Napoleon	58	−8	25.2	1.47	10.0
New England	64	−6	31.0	.....	.....
Oakdale	58	−11	29.7	1.04	6.0
Pembina	47	−15	20.3	0.34	3.4
Portal	45	−15	23.6	.....	.....
Power	59	−8	26.9	1.20	7.5
Steele	54	−9	26.1	0.86	8.6
University	49	−10	24.0	0.65	6.5
Wahpeton	58	−16	29.2	1.99	7.4
Willow City	51	−18	21.2	0.30	3.0
Woodbridge	40	−32	17.4	0.67	5.2
Ohio.					
Akron	70	−2	37.2	3.33	4.7
Annapolis	74	7	39.0	3.40	.....
Ashland	70	−2	37.8	2.69	8.2
Ashtabula	67	0	35.0	2.15	6.0
Atwater	.....	.....	.....	4.63	3.0
Bangorville	70	−5	38.4	3.57	5.5
Bellefontaine	67	−1	36.3	.....	.....
Bement	70	−1	31.2	3.26	2.5
Benton Ridge	70	0	38.0	3.15	4.7
Bethany	73	0	41.2	2.29	.....
Bigprairie	72	−1	39.2	2.48	0.5
Binola	.....	.....	.....	3.15	9.0
Bladensburg	72	−1	39.0	1.96	0.7
Bloomingburg	78	0	41.4	1.39	0.5
Bowling Green	72	1	37.0	2.86	3.0
Bucyrus	70	−2	36.6	1.65	1.5
Cambridge	79	0	41.6	3.10	1.0
Camp Dennison	76	5	43.2	2.08	T.
Canal Dover	73	0	39.6	3.01	2.5
Canton	69	−1	39.8	3.62	4.3
Cardington	70	−2	38.4	2.78	4.3
Cedarville	.....	.....	.....	2.59	2.7
Celina	71	0	37.8	3.14	3.0
Circleville	75	2	41.4	1.67	0.4
Clarksville	74	2	42.0	2.05	2.1
Cleveland *a*	69	−1	37.6	4.01	7.7
Cleveland *b*	71	0	37.6	2.86	4.5
Coalton	.....	.....	.....	3.74	T.
Colebrook	67	−8	34.7	2.65	8.0
Dayton *a*	.....	.....	.....	2.48	0.3
Dayton *b*	74	0	41.9	2.42	0.5
Defiance	73	1	36.6	2.35	1.2
Delaware	71	1	39.7	2.69	2.9
Demos	74	−2	40.5	3.03	2.0
Elyria	72	−2	37.0	3.24	1.2
Findlay	73	1	39.5	3.30	2.3
Frankfort	74	2	42.0	0.80	T.
Garrettsville	69	−3	36.8	3.57	4.4
Granville	73*c*	1*b*	38.0*c*	2.18	3.1
Gratiot	73	0	41.4	2.62	3.3
Green	79	8	44.6	1.40	T.
Greenfield *j*	63	3	38.8	1.35	T.
Greenhill	73	−6	37.1	3.36	6.1
Greenville	69	2	38.5	2.88	2.5
Hanging Rock	79	6	45.2	2.15	T.
Hedges	73	0	37.8	3.02	T.
Hillhouse	68	−4	34.2	2.76	5.0
Hiram	67	−7	35.8	3.51	4.5
Hudson	71	−7	36.1	1.84	6.0

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	Ins.	Ins.
Jacksonboro	73	1	39.7	1.80	T.
Killbuck	69	8	39.0	2.66	3.0
Lancaster	74	2	41.2	1.85	T.
Leipsic				2.20	3.0
Lordstown	67	−7	36.2	3.10	4.5
McConnelsville	79	1	42.0	2.78	1.0
Manara				1.07	0.5
Mansfield				4.40	5.5
Marietta	75	5	44.9	2.60	0.3
Marion	72	0	39.4	3.71	0.6
Medina	70	−4	38.0	3.70	5.0
Milfordton	70	1	36.6	3.23	4.3
Milligan	77	2	41.4	2.44	1.0
Millport	73	−5	37.6	3.33	6.8
Montpelier	70	0	34.4	2.44	5.0
Moorfield	76	−4	39.8	2.99	1.5
Napoleon	72	1	37.6	2.51	3.0
New Alexandria	73	−2	41.2	3.05	3.0
New Berlin	70	0	37.7	3.57	3.0
New Bremen	69	0	39.0	1.26	2.5
New Holland	76	2	43.6	1.37	1.0
New Paris	70	−2	40.0	2.99	0.2
New Richmond	75	3	42.8	1.74	0.7
New Waterford	70	−3	38.0	3.99	9.0
North Lewisburg	69	−3	39.0	3.60	2.0
North Royalton	70	−5	36.5	3.44	7.0
Norwalk	72	0	38.6	2.56	0.2
Oberlin	72	−3	37.6	2.80	4.5
Ohio State University	73	2	41.1	1.77	1.2
Orangeville	67	−4	36.4	3.10	2.0
Ottawa	73	1	39.3	2.60	5.0
Pataskala	72	0	40.0	2.06	3.4
Philo	73[h]	0	42.2[f]	2.03	0.4
Plattsburg	72	−1	39.0	2.35	8.0
Pomeroy	79	2	45.0	1.99	1.0
Portsmouth *a*				1.48	1.0
Pulse				1.70	0.7
Richwood	73	−2	40.4	2.84	T.
Ripley	75	2	43.8	1.40	0.5
Rittman	71	0	39.8	5.20	2.0
Rockyridge	71	−1	36.9	2.89	0.2
Rosewood	70	−1	39.0	3.58	2.5
Shenandoah	70	5	37.2	4.23	6.0
Sidney	74	−1	37.9	3.08	3.3
Sinking Spring	76	3	44.2	1.35	2.0
Somerset	75	0	42.0	1.85	0.5
Springboro				1.97	
Springfield				2.48	4.1
Strongsville				4.00	3.5
Swanton				2.05	T.
Thurman	78	1	45.5	1.65	T.
Tiffin	69	2	38.2	2.47	2.2
Urbana	70	1	38.5	3.32	2.2
Vanwert	72	1	38.0	2.04	1.3
Vermillion	70	0	37.0	2.84	5.0
Vickery	72	1	37.4	2.17	1.7
Walnut				1.53	1.1
Warren	68	−1	38.0	3.77	3.8
Warsaw	73	2	40.0	2.14	
Wauseon	72	−1	35.8	3.57	5.1
Waverly	78	3	43.5	1.65	0.2
Waynesville	73	1	40.9	2.20	1.0
Wellington	71[d]	−1	39.2[c]	2.94	1.0
Westerville	72	2	40.4	2.68	3.9
Wooster	69	−1	39.0	3.09	2.5
Zanesville				2.13	0.5
Oklahoma.					
Arapaho	87	19	51.4	0.69	
Beaver	87	13	48.2	0.37	3.0
Blackburn	86	9	48.1	3.25	T.
Burnett	86	11	49.8	0.61	T.
Clifton	88	8	50.1	0.52	
Fort Reno	88	12	50.2	2.81	T.
Fort Sill	83	16	53.2	0.04	
Hennessey	87	15	49.9	1.56	T.
Jefferson	86	7	44.2	0.72	T.
Jenkins	86	9	46.4	0.45	2.0
Kenton	82	18	43.8	0.45	4.0
Kingfisher	87	10	49.8	2.49	
Newkirk	80	11	47.3	2.14	T.
Norman	84	15	49.7	0.47	T.
Pawhuska	90	9	47.8	3.75	
Perry	86	13	48.4	2.53	T.
Prudence	88	12	46.3	0.64	T.
Sac and Fox Agency	88	16	48.3	0.95	
Stillwater	87	11	50.0	2.95	
Taloga	86	19	49.6	0.75	2.5
Texmo	86			0.92	3.2
Vittum	84	16	49.4	2.86	T.
Waukomis	88	16	49.8	1.65	
Woodward	87	17	51.6	0.51	2.5
Oregon.					
Albany *a* *[1]	62	32	47.1	4.80	
Albany *b*				3.38	
Alpha	73	30	45.8	8.94	0.2
Arlington	73	30	47.9	0.44	
Oregon—Cont'd.					
Ashland *b*	75	26	44.8	1.19	0.9
Aurora *[1]	67	32	45.7	3.88	
Aurora (near)	67	28	45.4	5.09	
Bay City	62	32	45.1	11.20	T.
Beulah	73	16	40.6	0.68	T.
Blalock	69	31	47.3	0.58	T.
Brownsville *[1]	70	38	47.4	2.27	
Bullrun	60	32	42.2	10.04	
Burns	64	12	36.1	0.30	3.0
Cascade Locks	70	37	48.8	9.54	
Comstock *[1]	60	30	44.0	3.82	
Coquille				5.29	
Corvallis	68	30	45.8	4.15	
Dayville	75	24	43.6	0.77	1.3
Ella				0.55	
Eugene	68	32	46.6	4.39	
Fairview	75	35	48.0	6.85	
Falls City	64	29	44.1	7.92	0.9
Forest Grove	68	23	45.4	5.17	
Gardiner	68	32	48.4	7.86	
Glenora	69	30	44.8	11.50	3.5
Government Camp	63	18	36.8	8.40	66.0
Grants Pass	75	29	46.6	2.66	
Hare	81	33	46.0	9.25	T.
Harris	70	30	45.4	5.20	
Heppner	68	25	43.0	0.94	T.
Hood River (near)	71	27	44.7	2.93	T.
Huntington	64	25	42.9	0.97	2.0
Jacksonville	71	28	45.7	1.82	
Joseph	61	16	33.6	1.55	15.5
Junction City *[1]	64	32	46.0	3.13	
Kerby		27		6.02	2.0
Klamath Falls	60	20	37.6		2.0
Lafayette *[1]	62	30	47.3	4.43	
Lagrande	63	24	40.4	1.74	2.5
Lakeview	66	14	38.3	0.59	3.0
McMinnville	66	30	45.2	5.81	
Merlin *[1]	72	30	48.6	1.86	
Monroe	67	28	45.6	4.99	
Mount Angel	64	29	45.5	4.23	
Nehalem				9.56	1.0
Newberg	68	33	47.6	5.36	
Newbridge	65	19	39.0	1.94	0.5
Newport	70	35	47.2	7.64	
Pendleton	78	26	47.2	1.41	T.
Placer				4.00	2.0
Prineville	74	14	44.2	0.66	3.0
Riddles *[1]	64	32	46.3	2.83	
Riverside	65	13	40.0	0.14	T.
Sheridan *[1]	63	33	44.5	4.63	
Silverlake	71	10	37.4	0.30	3.0
Silverton *[1]	64	36	46.5	4.98	
Sparta	57	16	35.2	1.10	11.0
Springfield *[1]	64	32	45.7	4.18	
Stafford	68	30	45.2	5.74	
The Dalles	67	22	45.6	0.68	
Toledo	70	30	44.7	7.09	
Umatilla				0.60	
Vale	65	15	40.6	0.59	
Westfork *[1]	70	34	44.8	4.52	0.5
Weston	68	25	42.4	3.70	0.5
Williams	71	28	45.3	2.02	
Pennsylvania.					
Aleppo	74	0	42.3	1.52	3.0
Altoona	70	−3	36.7	4.07	
Athens	60	−1	33.5	3.82	3.0
Beaver Dam				3.67	5.0
Bellefonte	68	1	38.8	3.98	4.0
Bethlehem				4.94	
Brookville				1.78	3.5
Browers Lock				4.99	
Butler	70	−4	36.6	5.11	8.9
Carlisle	78	5	38.4	2.09	2.0
Cassandra	67	−3	36.2	3.49	13.0
Chambersburg	71	5	39.8	2.74	1.7
Coatesville	75	9	41.0	5.73	0.4
Confluence	77	−2	36.8	4.35	5.9
Davis Island Dam				3.46	1.9
Drifton	60[c]	2[c]	35.6[c]	5.00	4.0
Driftwood				3.15	
Duncannon				4.76	0.5
Dushore	65	−8	32.5	4.37	3.3
Dyberry	56	−10	31.1	4.20	4.2
East Bloomsburg				3.41	2.0
East Mauch Chunk	62	−5	36.1	6.20	4.0
Easton	55	9	38.4	5.41	1.6
Ellwood Junction				4.34	3.5
Emporium	65	−1	34.9	3.01	2.5
Ephrata	73	8	39.8	3.66	1.3
Everett	72	0	41.0[b]	4.55	1.0
Franklin	80	−3	36.3	4.51	T.
Freeport				4.52	2.0
Girardville				5.68	6.8
Grampian	70	−2	36.2	1.88	5.0
Greensboro	78	2	39.8	2.62	T.
Hamburg				6.09	2.8
Pennsylvania—Cont'd.					
Hamlinton	55	−4	31.9	2.23	5.0
Hawthorn	69	−3	36.8	4.47	1.5
Herrs Island Dam				3.69	1.0
Huntingdon *a*	73	−2	39.6	4.18	5.0
Huntingdon *b*				3.30	4.0
Irwin				3.93	10.5
Johnstown	71	0	39.4	4.79	5.0
Keating				3.45	2.3
Kennett Square	73	9	41.2	4.65	0.2
Lancaster	70	10	40.2	3.99	1.0
Lawrenceville	59	−8	30.4	3.45	2.0
Lebanon	72	8	39.0	4.36	1.5
Leroy	57	−7	32.1	4.21	4.9
Lewisburg	61	5	38.0	4.49	3.0
Lockhaven *a*	68	2	39.1	3.94	3.0
Lockhaven *b*				4.11	T.
Lock No. 4				3.43	
Lycippus	72	−3	38.4	3.55	6.1
Oil City				4.34	3.5
Parker				4.66	5.2
Philadelphia	66	14	42.6	3.41	T.
Pottstown	62	13	40.0	5.19	0.5
Quakertown	61	7	38.8	5.11	1.0
Reading[2]			38.1	3.92	
Renovo *a*				3.46	0.1
Renovo *b*	61	2	36.8	3.22	0.5
Saegerstown	66	−11	35.2	5.21	2.2
St. Marys	58	−5	32.7		
Selinsgrove	62	6	39.7	4.11	2.0
Shawmont				3.95	
Sinnamahoning				1.42	
Smethport	61	−6	31.8	4.10	3.0
Somerset	74	−6	36.6	7.21	11.6
South Eaton	60	2	35.8	3.73	1.0
State College	64	−1	36.0	3.71	8.1
Sunbury				2.10	3.0
Towanda	58	−2	34.0	3.92	2.5
Troutrun				3.98	2.5
Uniontown	73	2	42.2	4.86	3.8
Warren	60	−6	32.8	3.66	1.7
Wellsboro	58	−1	34.7	2.53	2.5
Westchester	70	10	40.8	4.93	
West Newton				3.25	1.0
Westtown	70	10	38.8	4.43	0.2
Wilkesbarre	60	6	36.0	3.81	4.2
Williamsport	62	0	38.0	3.63	2.0
York	75	8	41.2	3.94	0.8
Rhode Island.					
Bristol	54	13	36.4	5.52	T.
Kingston	53	4	34.6	8.58	T.
Pawtucket	56	15	39.4	7.67	T.
Providence *a*	57	11	37.8	8.10	T.
Providence *c*	52	8	35.5	8.19	T.
South Carolina.					
Batesburg	79	19	52.7	4.40	
Beaufort	80	28	56.8	2.30	
Blackville	83	20	55.0	3.59	
Calhoun Falls				5.88	
Camden				6.49	
Cheraw *a*	81	16	53.8	3.80	
Cheraw *b*				3.64	
Clemson College	76	12	48.6	6.18	
Conway				5.31	
Darlington				4.45	
Edisto[1]				4.23	
Effingham				2.73	
Florence	80	22	52.9	3.07	
Gaffney				5.06	
Georgetown	79	22	56.0	4.27	
Gillisonville	86	19	56.4	3.68	
Greenville	75	13	47.7	8.68	
Greenwood	75	17	50.6	4.24	
Kingstree *a*	77	22	53.9	3.24	
Kingstree *b*				3.18	
Liberty	76	10	49.5	8.68	
Little Mountain	78	18	54.0	4.15	
Longshore	77	17	52.6	4.65	
McCall	79	12	54.1	3.09	
Pinopolis *[1]	76	23	55.2	2.27	
St. Georges	82	21	53.8	2.66	
St. Matthews	80	20	54.2	2.88	
St. Stephens				4.17	
Santuck	78	12	52.2	4.91	
Shaws Fork				5.19	
Smiths Mills				5.63	
Society Hill	79	19	53.8	3.83	
Spartanburg	74	14	50.0	7.19	
Statesburg	82	20	56.0	3.75	
Summerville	80	20	55.8	3.00	
Temperance	79	17	53.0	3.14	
Trenton	79	24	57.2	4.27	
Trial	77	13	52.4	3.26	
Walhalla	77	11	49.7	8.24	T.
Winnsboro	78	18	51.0	3.89	
Winthrop College	76	17	52.2	3.99	
Yemassee	79	23	54.5	2.27	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Yorkville	79	20	54.8	8.13	
South Dakota.					
Academy	74	1	34.8	0.72	3.4
Alexandria	76	− 1	32.4	0.90	4.0
Ashcroft	73	− 5	32.9	0.50	5.0
Badnation *	76	1	34.1	0.97	3.0
Bowdle	70	− 6	27.1	0.74	0.5
Brookings	61	− 9	29.2	0.50	3.0
Bulkley	72	− 2	30.3	0.22	2.0
Canton	69	− 1	34.8	0.90	2.5
Centerville	.....	.....	.....	1.02	5.9
Chamberlain	78	1	34.7	1.38	3.3
Clark	67	0	31.2	0.78	2.5
Desmet	70	− 5	32.6	2.30	11.0
Doland	70	−16	31.6	0.53	1.5
Elkpoint	70	4	35.6	1.10	7.0
Faulkton	72	− 1	30.7	0.50	3.0
Flandreau	66	− 6	30.6	0.54	3.0
Forestburg	72	− 1	32.5	0.75	7.5
Fort Meade	68	− 1	33.0	1.71	12.0
Fort Randall	79	− 1	34.4	0.10	T.
Grand River School	72	− 5	32.0	0.23	3.0
Greenwood	77	3	36.7	0.71	1.5
Hartman	69	− 5	31.2	0.64	1.4
Highmore	74	− 1	31.7	0.60	6.0
Hotch City	75	− 1	34.3	0.94	3.0
Howard	70	1	31.4	0.50	2.2
Interior	73	2	35.6	1.36	13.6
Ipswich	72	− 6	30.0	0.05	T.
Kimball	74	− 1	34.2	1.14	6.3
Leola	71	− 8	29.8	0.32	0.8
Leslie	75[f]	−12	32.2[c]	0.71	.....
Mellette	73	1	32.8	0.16	T.
Menno	76	− 1	34.1	0.57	2.3
Millbank	63	− 5	30.0	2.27	12.0
Mitchell	74	3	36.0	0.86	2.0
Mound City	76	− 8	30.6	0.62	6.0
Oelrichs	79	2	32.1	1.35	13.5
Pine Ridge	69	0	34.4	0.71	11.1
Plankinton	73	2	31.7	1.65	2.0
Redfield	73	− 2	32.9	0.27	1.4
Rochford	65	− 5	28.6	2.10	18.7
Rosebud	73	0	35.8	2.60	26.0
St. Lawrence	.....	.....	.....	0.50	T.
Silver City	.....	.....	.....	0.87	8.0
Sisseton Agency	62	− 8	27.4	1.86	7.4
Spearfish	64	− 1	31.8	1.95	21.5
Tyndall *	66	2	33.6	.....	.....
Vermillion	74	2	35.9	0.87	8.0
Watertown	64	− 7	28.4	0.38	3.8
Waubay	59	− 9	26.0	0.78	4.0
Wentworth	68	− 4	31.5	0.31	.....
Wolsey	.....	.....	.....	1.15	4.0
Tennessee.					
Andersonville	.....	8	.....	5.40	
Ashwood	80	12	50.5	1.66	
Benton	78	13	50.4	8.03	
Bluff City	.....	.....	.....	3.28	T.
Bolivar	80	17	49.2	3.41	T.
Bristol	76	8	43.6	3.48	T.
Byrdstown	80	6	47.8	4.31	3.3
Carthage	.....	11	.....	3.94	.....
Charleston	.....	.....	.....	7.89	T.
Clarksville	77	14	49.6	3.76	T.
Clinton	.....	.....	.....	5.31	T.
Decatur	74	11	49.4	6.00	T.
Dickson	78	12	49.6	2.06	T.
Dover	80	14	48.8	4.30	
Elizabethton	76	7	45.5	3.26	T.
Elk Valley	75	5	46.1	2.85	T.
Erasmus	74	5	44.8	4.52	2.0
Florence	78	13	50.0	2.50	T.
Franklin	85	13	49.8	1.91	T.
Grace *[1]	70	12	44.9	3.80	1.0
Greeneville	78	6	46.7	4.82	0.7
Harriman	76	10	47.4	6.12	T.
Hohenwald	78	11	49.8	2.66	2.0
Iron City	80	14	50.8	2.10	T.
Jackson	78	17	51.0	3.50	
Johnsonville	82	13	50.0	2.89	T.
Jonesboro *[1]	74	11	45.3	3.92	0.6
Kingston	.....	.....	.....	5.44	T.
Lafayette *[5]	72	7	43.6	4.65	T.
Lewisburg	80	12	50.0	3.03	0.4
Liberty	82	14	50.7	2.19	T.
Lynnville	78	14	49.6	3.16	T.
McMinnville	79	10	50.8	3.38	0.3
Maryville	80	11	50.0	5.42	0.4
Newport	79	12	47.6	6.31	2.0
Nunnelly	82	12	50.2	1.93	T.
Oakhill	79	6	48.2	4.23	4.5
Palmetto	79	12	50.8	2.55	T.
Peryear *[5]	73	20	48.6	3.60	T.
Pope	80	13	51.4	2.91	T.
Rogersville	76	9	45.9	4.66	0.4
Rugby	76	0	45.5	4.69	0.5
Tennessee—Cont'd.					
Savannah	80	17	52.4	3.07	T.
Sewanee	73	7	46.6	5.41	0.5
Silverlake	.....	4	.....	4.18	1.0
Springdale	78	8	44.8	5.11	0.5
Springfield	79	12	49.6	1.30	T.
Tazewell	.....	.....	.....	5.35	0.4
Tellico Plains	79	12	50.7	8.54	T.
Tracy City	74	8	46.4	5.69	1.7
Tullahoma	77	10	49.6	4.15	T.
Union City	.....	22	.....	2.48	T.
Waynesboro	78	12	50.0	2.69	0.1
Wildersville	78	18	51.2	3.40	T.
Yukon	78	13	50.6	5.88	
Texas.					
Alvin	.....	.....	.....	0.74	
Anna[1]	79	12	53.0	3.44	
Anson	.....	.....	.....	0.25	
Arthur	.....	.....	.....	5.44	
Austin *a*	90	25	58.4	1.60	
Austin *b* *[5]	88	31	58.0	.....	
Ballinger	88	20	53.2	0.08	
Bastrop	89	32	57.8	1.22	
Beaumont	79	35	60.2	1.98	
Bigspring	.....	.....	.....	T.	
Blanco	90	20	53.7	0.86	
Boerne *[1]	92	28	56.4	1.20	
Booth	.....	.....	.....	1.46	
Bowie	86	23	55.2	0.63	
Brazoria	85	36	61.0	1.02	
Brenham	88	31	62.0	2.44	
Brighton	84	40	64.4	0.09	
Brownwood	89	22	56.4	1.27	
Burnet *[1]	88	22	59.2	2.25	
Camp Eagle Pass	100	28	62.2	0.60	
Coleman	90	25	58.0	0.56	
Colorado	87[f]	21[f]	54.0[f]	0.13	
Columbia	82	32	61.6	1.78	
Corsicana	85	27	55.2	2.93	
Cuero	90	30	61.8	1.03	
Dallas	87	24	55.4	2.39	
Danevang	83	29	60.7	1.08	
Dublin	87	.....	.....	0.80	
Duval	94	32	60.2	1.63	
Estelle	89	22	56.8	3.14	
Fort Ringgold	103	40	72.0	T.	
Fort Stockton	.....	.....	.....	0.00	
Fredericksburg *[1]	87	25	55.4	0.76	
Gainesville	82[c]	16[d]	52.4[c]	1.60	
Grapevine	90	23	59.5	2.68	
Greenville	84	18	55.3	2.88	
Hale Center	.....	21	.....	T.	
Hallettsville	86	31	64.6	0.78	
Haskell	90	12	54.7	0.10	
Henrietta	83	19	55.4	0.54	
Hewitt	.....	.....	.....	1.65	
Hondo	.....	.....	.....	0.12	
Houston	83	32	60.0	2.40	
Ira	89	20	54.5	T.	
Jacksonville	85	25	57.4	4.23	
Jasper	89	31	59.8	3.28	
Kaufman	85	24	57.6	.....	
Kent	.....	.....	.....	0.05	
Kerrville	95	20	52.8	0.43	
Kopperl	.....	.....	.....	1.65	
Lampasas	92	20	57.0	0.89	
Laureles Ranch	.....	.....	.....	0.00	
Llano *[5]	86	28	59.1	0.55	
Longview	83	28	55.1	4.00	
Luling	92	27	60.9	0.78	
Mann	87	22	54.8	3.12	
Menardville	88	18	55.9	0.27	
Mount Blanco	.....	.....	.....	T.	T.
Nacogdoches	85	27	57.4	3.51	
New Braunfels	92	32	61.2	1.40	
Panter	.....	.....	.....	0.76	
Port Lavaca	88	37	65.3	0.80	
Rhineland	88	19	54.6	0.15	
Rockisland	86	30	62.4	0.93	
Rockport *[1]	82	50	65.4	.....	
Runge	95	31	65.2	0.47	
Sabine	84	35	64.3	1.75	
Saginaw *[1]	80	21	55.9	1.92	
Sanderson	80	30	57.0	0.00	
San Marcos	92	26	61.7	0.87	
San Saba	92	20	60.2	1.15	
Sherman	79	24	55.8	3.42	
Sugarland	84	31	63.2	1.95	
Temple *a*	88	29	59.0	2.48	
Temple *b*	86	26	57.8	2.19	
Trinity	85	28	60.2	4.85	
Waco	88	26	58.7	3.71	
Waxahachie	93	18	58.0	3.10	
Weatherford	81	24	56.2	1.72	
Wichita Falls	.....	.....	.....	0.50	
Utah.					
Blackrock	67	11	37.8	0.34	2.8
Utah—Cont'd.					
Bluecreek *[1]	60	25	36.4	0.75	7.0
Castledale	65	11	35.0	0.11	
Cisco	.....	.....	.....	0.55	
Corinne	65	16	39.4	0.61	
Deseret	68	14	38.6	0.80	
Emery	.....	10	.....	0.10	1.0
Farmington	60	14	37.1	1.63	10.4
Fillmore	71	17	40.3	1.54	.....
Fort Duchesne	64	12	36.4	0.15	1.0
Frisco	63	14	37.7	0.28	0.5
Giles	74	8	41.7	T.	
Government Creek	65	12	36.0	1.56	13.6
Green River	73[c]	15[c]	43.0[c]	T.	
Grover	64	12	37.0	0.40	4.0
Heber	60	14	34.4	1.56	11.0
Henefer	62	8	31.0	2.02	15.5
Hite	76	28	49.4	.....	
Holyoake	73	20	44.7	0.33	
Huntsville	.....	.....	.....	1.63	11.5
Kelton *[1]	60	27	39.8	0.20	2.0
Lasal	62	12	34.4	.....	
Levan	64	12	36.1	1.88	14.8
Loa	61	− 1	26.8	0.35	3.5
Logan	61	13	37.1	1.40	.....
Lund	67	9	36.4	T.	T.
Manti	65	15	36.4	1.00	7.0
Marysvale	.....	.....	.....	0.66	5.2
Meadowville	51	8	28.8	0.60	2.0
Millville	.....	.....	.....	0.80	.....
Minersville	66	16	38.8	0.51	3.0
Moab	78	20	41.6	0.56	2.0
Mount Pleasant	63	15	38.0	2.37	17.0
Ogden *[1]	64	18	38.7	0.45	4.5
Park City	57	7	28.8	3.15	31.5
Parowan	65	11	37.2	0.85	7.5
Pinto	60	2	33.0	0.23	2.0
Promontory *[1]	50	22	34.4	0.35	3.5
Provo	66	19	39.2	1.09	.....
Richfield	65	8	34.1	1.07	10.0
St. George	78	18	46.4	0.08	
Scipio	71	10	35.5	1.02	1.0
Snowville	62	12	35.3	0.95	9.5
Terrace *[1]	52	20	33.8	0.70	7.0
Thistle	71	10	37.1	2.40	24.0
Tooele	61	20	37.8	1.54	17.3
Tropic	62	6	32.1	T.	T.
Vernal	63	14	38.6	0.31	T.
Wellington	67	9	37.0	0.10	1.0
Vermont.					
Bennington	64	− 3	30.6	3.78	4.0
Burlington	48	− 1	29.0	2.73	5.0
Chelsea	50	− 9	24.8	2.73	16.0
Cornwall	54	− 4	28.0	1.17	2.0
Enosburg Falls	55	−24	24.2	5.97	37.8
Hartland	49	− 9	28.3	4.53	11.4
Jacksonville	49	−16	27.2	5.65	18.0
Manchester	52	− 4	28.4	3.86	13.1
Norwich	47	−12	27.0	4.01	11.0
St. Johnsbury	50	−16	27.0	3.31	12.0
Vernon *[6]	52	− 8	32.8	6.54	5.0
Wells	53	− 4	27.1	4.82	17.5
Woodstock	52	−10	29.8	4.17	15.5
Virginia.					
Alexandria	75	14	46.2	2.69	T.
Ashland	83	11	49.4	3.82	0.5
Barboursville	.....	12	.....	2.80	
Bedford	76	12	48.8	3.72	T.
Bigstone Gap	*76	12	45.0	4.64	1.0
Birdsnest[2]	.....	.....	44.3	3.85	
Blacksburg	69	6	42.6	3.41	T.
Bon Air	72	13	47.9	4.28	
Buckingham	74	5	46.6	2.40	
Burkes Garden	68	− 3	40.1	2.96	5.0
Callaville	73	4	49.0	5.73	
Charlottesville	76	11	47.4	2.45	
Christiansburg	.....	.....	.....	2.95	T.
Clarksville	.....	.....	.....	3.70	
Cliftonforge	.....	.....	.....	4.50	
Columbia	74	8	42.7	2.10	
Dale Enterprise	72	2	42.4	3.86	T.
Danville	.....	.....	.....	3.18	
Doswell	75	10	45.0	1.98	
Farmville	75	16	48.8	3.10	
Fontella	74	11	48.9	3.87	T.
Fredericksburg	75	14	47.6	3.02	T.
Grahams Forge	70	5	45.1	3.94	T.
Hampton	72	17	50.2	3.92	T.
Hot Springs	67	2	40.6	3.91	T.
Lexington	72	8	44.8	3.97	T.
Lincoln	68	8	43.0	3.07	
Marion	77	5	44.2	3.50	0.5
Newport News	73	23	51.6	3.25	
Petersburg	73	11	50.0	3.99	0.5
Quantico	75	10	45.8	.....	
Radford	.....	.....	.....	2.05	1.0
Rockymount	.....	.....	.....	3.20	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Salem	......	......	......	3.43	
Speers Ferry				5.41	1.0
Spottsville	72	10	50.0	3.53	1.0
Stanardsville	71	15	45.3	4.34	T
Staunton	73	8	45.6	3.39	T.
Stephens City	78	5	44.0	4.29	T.
Warsaw	69	9	46.4	4.30	2.0
Westpoint	70	7	47.8	4.90	4.0
Williamsburg	72	8	49.4	3.86	T.
Woodstock	72	8	41.8	3.49	
Wytheville	72	5	43.9	3.06	0.5
Washington.					
Aberdeen	65	......	......	7.18	
Anacortes	......	......	......	2.03	
Ashford	......	......	......	6.60	3.0
Bremerton	69	31	45.6	2.44	T.
Bridgeport	81	20	46.8	0.10	
Brinnon	63	32	44.0	3.47	
Cedonia	56	22	36 8	1.00	3 6
Centerville	60	26	39.3	0.87	0.2
Cheney	......	......	......	1.35	
Clearwater	61	31	43.8	9.67	
Cle Elum	65	19	38.8	1.37	1.5
Colfax	69	26	42.8	2.24	1.0
Colville	63	19	39.2	0.82	0.5
Conconully	55	18	36.8	0.47	4.7
Connell	......	......	......	0.66	
Coupeville	60	33	44.1	0.95	
Crescent	60	23	39.3	1.07	T.
Dayton	84	26	45.4	1.93	
Ellensburg	59	19	40.1	0.31	
Ellensburg (near)	66	18	40.2	0.03	T
Grandmound	66	30	45.2	4.46	
Granite Falls	......	......	......	5.66	
Hooper	71	25	44.6	0.63	T.
Issaquah	......	......	......	4.53	
Lacenter	66	28	44.5	5.89	
Lakeside	50	24	42.1	0.52	
Lind	67	23	42.0	0.63	T.
Loomis	69	28	45.6	......	......
Mayfield	56[j]	29[j]	44.4[j]	6.54	
Monte Cristo	61[f]	18[f]	37.2[f]	10.40	82.8
Mottinger Ranch	69	31	47.5	0.54	
Mount Pleasant	66	33	45.6	6.37	
Moxee Valley	66	17	41.6	0.20	T.
Northport	60	18	39.2	0.65	6.0
Olga	58	32	43.4	2.04	
Olympia	66	29	45.2	4.25	
Pasco	73	25	46.8	0.09	
Pinehill	66	28	45.0	1.90	0.3
Port Townsend	58	34	45.0	0.54	
Pullman	61	27	41.0	1.77	0.2
Republic	59	16	37.2	0.70	7.0
Rosalia	60	27	40.0	1.74	0.3
Silvana	66	28	44.8	2.06	
Snohomish	68	29	45.0	4.06	
Snoqualmie	......	......	......	5.64	
Southbend	61	29	44.0	7.15	
Sprague	......	......	......	0.09	
Sunnyside	66	22	43.0	0.14	
Twin	57	30	42.2	3.11	
Union	68	28	44.7	5.58	1.6
Usk	58	19	36.9	......	......
Vancouver	68	30	46.2	4.71	
Vashon	61	32	44.5	2.40	
Waterville	54	17	36.0	0.52	4.0
Wenatchee (near)	60	23	39.8	0.47	2.0
Whatcom	64	28	45 4	2.89	
Wilbur	59	22	38.6	0.84	1.0
West Virginia.					
Beckley	65	0	39.8	2.57	4.0
Beverly	81	2	38.7	4.44	11.0
Bluefield	74	1	43.4	2.39	5.0
Buckhannon	75	1	41.0	3.78	2.0
Burlington	73	5	42.0	2.40	2.0
Byrne	78	2	44.8	3.00	5.0
Camden	75	6	45.0	3.66	4.2
Central	75	2	42.4	3.38	2.0
Chapel	70	4	44.6	......	......
Charleston	......	......	......	3.36	2.5
Clay	80	6	42.8	5.45	1.0
Creston	74	5	42.2	3.12	2.0
Dayton	77	2	42.3	3.06	2.5
Echo	72	4	43.0	......	......
Elkhorn	74	3	45.6	3.96	3.5
Fairmont	......	......	......	3.54	1.0
Glenville	78	4	42.2	3.26	2.5
Grafton	77	0	42.0	3.63	3.8
Harpers Ferry	......	......	......	5.27	T.
Hinton *a*	......	......	......	2.60	2.8
Hinton *b*	72	6	43.6	......	......
Huntington	80	6	44.6	2.46	1.5
Josiah	76	4	43.4	3.35	2.5
Lewisburg	67	3	41.5	2.27	0.5
Magnolia	78	8	43.2	3.07	1.5
Mannington	78	2	44.2	2.81	0.4
West Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Marlinton	69	1	38.6	3.06	0.5
Martinsburg	74	6	41.2	3.08	T.
Morgantown	76	0	42 5	3.67	1.0
Moscow	71	2	40.2	4.63	7.0
New Martinsville	78	4	43 0	3.44	2.0
Nuttallburg	79	1	40.7	4.40	6 0
Oceana	75	5	41.2	3.25	......
Oldfields	77	8	44.8	1.94	......
Parsons	77	0	39.5	0.90	2 0
Philippi *a*	77[f]	−3[f]	42.0[f]	3.26	1.0
Point Pleasant	83	4	45.0	2.35	T.
Powellton	79	6	45.8	4 53	3.0
Princeton	70	5	42.6	4 50	3.5
Romney	76	4	42.4	2.51	T.
Rowlesburg	......	......	......	4.01	4.0
Southside	79	8	46.3	2.37	1.2
Spencer	80	3	46.4	2.99	1.0
Terra Alta	70[e]	−11[e]	38.0[e]	4.80	19.0
Uppertract	73	4	42 6	2.53	......
Wellsburg	72	−1	39.7	2.81	2.0
Weston *a*	......	......	......	3.88	1.7
Weston *b*	78	4	44.6	......	......
Wheeling *a*	......	......	......	3.43	1.5
Wheeling *b*	77	4	46.3	3.43	0 5
Williamson	81	6	48.2	3 97	9.2
Winfield	76	6	45.1	2.38	0.5
Wisconsin.					
Amherst	51	−10	25.8	2 82	23.0
Ashland	......	......	......	2.81	13.6
Barron	56	−14	23.7	3.50	29.0
Bayfield	46	−10	22.8	......	......
Beloit	60	1	32.5	2.75	5.5
Brodhead	60	0	32.4	2.83	7.0
Butternut	......	38	......	2.30	33.0
Darlington	59	−1	31.0	2.23	7.0
Delavan	......	−1	......	3.15	......
Dodgeville	58	−4	30.3	1.75	8.5
Easton	50	−12	27.3	2.47	12.8
Eau Claire	50	−9	28.7	3.58	27.0
Florence	48	−11	22.7	3.35	19.0
Fond du Lac	50	−2	29.2	2.62	6.5
Grand River Locks	......	......	......	3.00	19.0
Grantsburg	64	−2	27.0	3.98	28.0
Hartland	57	−4	29.6	3.88	2.0
Harvey	59	−2	31.0	2.75	7.3
Hayward	54	−17	25.4	2.15	20.0
Hillsboro	55	−7	27.5	2.08	19.0
Koepenick	......	......	......	3.90	32.0
Lancaster	58	−3	29.7	2.83	11.0
Madison	54	−4	29.8	2.77	3.5
Manitowoc	45	−4	28.4	5.14	11.0
Meadow Valley	53	−7	26.4	2.19	19.5
Medford	56	−18	22.8	1.75	17.5
Menasha	......	......	......	2.25	8.8
Neillsville	56	−10	26.7	3.10	24.0
New London	45	−6	26.6	3.34	17.0
Oconto	49	−5	27.6	3.44	27.5
Osceola	48	−10	26.4	3.24	27.0
Oshkosh	44	−4	28.2	3.15	......
Pepin	54	−10	28.0	2.21	14.0
Pine River	49	−7	27.0	1.91	16.7
Portage	53	−3	29.5	2.50	12.0
Port Washington	50	−5	29.8	5.15	17.0
Prairie du Chien *a*	60	−0	33.1	3.04	11.8
Prairie du Chien *b*	......	......	......	2.83	9.5
Racine	58	1	33.2	3.79	......
Shawano	50	−5	26.4	2.53	17.0
Sheboygan	48	−1	30.2	4.57	24.5
Spooner	46	−14	24.4	4.90	34.0
Stevens Point	50	−10	27.4	2.37	21.2
Valley Junction	50	−7	28.3	3.01	22.0
Viroqua	53	−5	29.2	2.73	18.8
Watertown	59	−2	29.8	2.84	8.0
Waukesha	57	−4	29.4	2.95	3.9
Waupaca	45	−6	26.6	2.93	26.2
Wausaukee	50[d]	−10[e]	25.0[e]	2.10	......
Westfield	50	−2	28.2	2.60	17.0
Whitehall	50	−15	28.3	2.16	14.8
Wyoming.					
Alcova	62	8	34.8	1.20	12.0
Basin	......	......	......	T.	T.
Bedford	55	−3	27.2	1.68	15.4
Bigpiney	43	0	21.2	......	......
Bitter Creek	60	8	32.8	0.90	9.0
Buffalo	70	1	33.4	0.63	6.0
Casper	61	−4	34.6	1.08	10.5
Centennial	48	−5	25.0	0.88	9.5
Chugwater	63	−3	32.1	1.25	12.5
Cody	67	1	36.4	0.40	4.5
Daniel	46	−10	18.0	0.20	2.0
Evanston	53	−2	25.8	0.86	7.8
Fort Laramie	69	0	35.6	2.11	21.0
Fort Washakie	61	6	31.8	0.03	0.3
Fort Yellowstone	49	1	27.2	1.46	14.6
Fourbear	58	−10	28.2	0.40	8.6
Griggs	62[f]	9[f]	29.5[f]	0.86	......
Wyoming—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hyattville	64	6	33.7	T.	T.
Iron Mountain	58	3	31 2	0.50	5 0
Laramie	56	−2	26.6	0.05	0.5
Lovell	65	0	30.8	0.09	T.
Lusk	60	0	31.0	1.06	10.6
Myersville	55	1	26.2	0.08	0.8
Parkman	66	−4	32.7	0.64	18.1
Pinebluff	68	6	34.4	0.80	8.0
Rawlins	53	−4	27.0	1.67	16.7
Saratoga	54	2	28.6	2 45	22.0
Sheridan	67	1	34.0	1.87	18.5
South Pass City	68	0	23.4	0.69	6.9
Thayne	47	−3	26.5	0.61	6.0
Thermopolis	66	−8	35.8	1.70	17.0
Wheatland	64	4	39.4	0.76	......
Cuba.					
Aguacate	91	44	71.7	1.48	
Alvarez	......	......	......	1.85	
Australia	91	48	72.9	1.82	
Banaguises	91	55	74.1	2.55	
Batabano	86	42	70.3	1.35	
Camajuani	92	51	71.8	0.44	
Cruces	......	......	......	1.70	
Gibara	92	58	74.8	1.32	
Guabairo	......	......	......	1.50	
Guanajay	86	51	71.4	1.27	
Guantanamo	92	56	75.5	1.17	
Holguin	98	59	73.9	0.15	
Isabel, Guantanamo	......	......	......	1.90	
Los Canos	92	49	75.0	1.43	
Magdalena[1]	92	46	72.4	1.78	
Manzanillo	94	60	77.7	1.18	
Matanzas	91	50	72.4	1.54	
Moron Trocha	95	54	75.4	1.50	
Nuevitas	96	60	78.3	2.21	
Pinar del Rio	89	49	72.6	1.61	
Sagua La Grande	95	54	73.2	1.49	
San Ceyetano	94	49	71.9	0.95	
Santa Clara	94	51	72.5	0.41	
Sancti Spiritus	88	59	73.4	1.36	
Santa Cruz del Sur	86	51	71.8	......	
Soledad	88	49	71.8	1.61	
Soledad, Guantanamo	94	53	75.0	2.94	
Union de Reyes	90	61	73.6	0.75	
Yaguajay	95	57	74.6	0.93	
Porto Rico.					
Adjuntas	87	......	......	8.35	
Aguadilla	89	64	77.6	7.29	
Arecibo	88	61	74.1	7.59	
Bayamon	97	59	76.6	9.65	
Caguas	88	61	73.8	......	
Canovanas	89	68	77.6	6.33	
Cayey	96	55	75.5	6.79	
Cidra	89	53	71.8	7.77	
Coamo	93	62	77.4	2 08	
Corozal	90	52	73.6	11.96	
Fajardo	90	63	78.4	3.90	
Hacienda Coloso	95	58	75.0	8.13	
Hacienda Perla	87	65	76.2	9.47	
Humacao	84	60	72.2	4.51	
Isabela	89	63	75.6	3.90	
Juana Diaz	91	60	77.8	2.36	
La Isolina	88	61	73.5	11.40	
Lajas	90	54	74.6	2.63	
Manati	94	61	75.9	12.58	
Maunabo	86	68	77.4	3.72	
Mayaguez	91	62	77.0	5.72	
Morovis	89	60	73.6	12.26	
Ponce	......	......	......	0.88	
Port Ame ica	88	61	77.2	0.91	
Salinas	......	......	......	0.92	
San Lorenzo	90	57	74.4	8.60	
Utuado	92	......	......	8.71	
Vregues	93	70	81.0	3.11	
Yauco	85	60	74.8	3.16	
Mexico.					
Ciudad P. Diaz	94	36	65.2	0.00	
Leon de Aldamas	86	34	59.7	0.00	
Puebla	82	39	61.9	T.	
Topolobampo*[1]	89	45	67.7	T.	
New Brunswick.					
St. John	48	3	29.7	3.76	12.8
Isthmus of Panama.					
Alhajuela	92	66	79.9	1.81	
La Boca	91	71	81.5	......	

Late reports for February, 1901.

Stations.	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alaska.					
Juneau	44	13	26.0	6.32	48.5
Killisnoo	41	9	23.2	6.05	43.5
Orca	38	8	25.1	1.21	15.5
Sitka	45	13	30.2	6.88	15.0
Wood Island	58	4	30.6	0.30	2.5

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Arkansas.					
Pocahontas	57	15	32.6	3.48	2.5
California.					
Fordyce	......	......	......	16.34	107.0
Idylwild	......	......	......	5.81	58.1
Kennedy Gold Mine	70	22	44.4	12.89	9.0
Snedden	......	......	......	3.80	29.0
Yuba City *[5]	76	30	52.8	6.24	
Delaware.					
Milford	51	17	29.7	0.22	2.0
Idaho.					
Soldier	46	−26	18.4	2.91	19.2
Kansas.					
Fanning	......	−16	......	1.63	19.5
Hays	70	−10	24.3	1.45	14.5
Wallace	......	......	......	0.27	1.8
Winfield	69	8	33.7	0.94	T.
Kentucky.					
Carrollton	58	9	28.8	0.82	T.
Maryland.					
Frostburg	48	0	22.0	1.25	8.5
Hagerstown	55	7	27.6	0.58	4.3
Laurel	55	0	27.3	0.90	T.
Smithsburg *a*	54	0	26.7	0.80	2.0
Smithsburg *b*	53	4	25.0	1.12	3.5
Westernport	50	8	23.6	0.29	2.0
Massachusetts.					
Attleboro	......	......	......	0.76	......
Mississippi.					
Stonington *[1]	76	24	47.9	......	......

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Missouri.					
Carrollton	48	−1	24.8	1.57	15.5
Unionville	48	0	23.2	1.24	13.0
Nebraska.					
Agate	......	......	......	1.15	11.5
New Jersey.					
Freehold	45	6	24.1	1.00	3.0
Ohio.					
Hudson	41	−3	19.0	1.95	16.5
New Alexandria	43	2	21.8	0.30	3.0
Oregon.					
Monroe	72	21	42.4	6.18	1.0
Vale	57	0	31.8	2.11	8.0
Pennsylvania.					
Everett	51	5	23.3	0.78	7.5
South Carolina.					
Batesburg	71	15	42.4	4.55	5.0
Virginia.					
Bedford	66	14	34.7	0.90	T.
Washington.					
Pullman	59	11	33.8	3.34	0.5
Ritzville	......	......	......	1.65	1.5
Cuba.					
Gibara	94	56	73.6	1.40	
Porto Rico.					
Vieques	93	65	78.8	4.18	
Isthmus of Panama.					
Albajuela	91	66	78.4	0.04	
La Boca	88	69	79.9	......	

EXPLANATION OF SIGNS.

* Extremes of temperature from observed readings of dry thermometer.

A numeral following the name of a station indicates the hours of observation from which the mean temperature was obtained, thus:

[1] Mean of 7 a. m. + 2 p. m. + 9 p. m. + 9 p. m. ÷ 4.
[2] Mean of 8 a. m. + 8 p. m. ÷ 2.
[3] Mean of 7 a. m. + 7 p. m. ÷ 2.
[4] Mean of 6 a. m. + 6 p. m. ÷ 2.
[5] Mean of 7 a. m. + 2 p. m. ÷ 2.
[6] Mean of readings at various hours reduced to true daily mean by special tables.
[7] Mean from hourly readings of thermograph.
[9] Mean of sunrise and noon.
[10] Mean of sunrise, noon, sunset, and midnight.

The absence of a numeral indicates that the mean temperature has been obtained from daily readings of the maximum and minimum thermometers.

An italic letter following the name of a station, as "Livingston *a*," "Livingston *b*," indicates that two or more observers, as the case may be, are reporting from the same station. A small roman letter following the name of a station, or in figure columns, indicates the number of days missing from the record; for instance "n" denotes 14 days missing.

No note is made of breaks in the continuity of temperature records when the same do not exceed two days. All known breaks, of whatever duration, in the precipitation record receive appropriate notice.

CORRECTIONS.

January, 1901, Blaine, Colo., make mean temperature 35.8 instead of 36.7. Laurel, Md., make precipitation read 3.02 instead of 2.94.

February, 1901, Eureka Ranch, Kans., make precipitation read 0.75 instead of 0.65.

NOTE.—The following changes have been made in the names of stations: Florida, Dalkeith, changed to Wewahitchka. Montana, Dearborn Canyon, changed to Clemons. Washington, New Whatcom, changed to Whatcom.

TABLE III.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of March, 1901.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
	Hours.	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
New England.						
Eastport, Me	21	16	14	24	n. 63 w.	11
Portland, Me	22	19	9	27	n. 81 w.	18
Northfield, Vt	25	35	1	5	s. 23 w.	11
Boston, Mass	19	12	12	30	n. 69 w.	19
Nantucket, Mass	16	18	15	28	s. 81 w.	13
Block Island, R. I	14	14	19	31	w.	12
New Haven, Conn	20	15	12	29	n. 74 w.	18
Middle Atlantic States.						
Albany, N. Y	21	26	1	18	s. 74 w.	18
Binghamton, N. Y †	11	5	12	10	n. 18 e.	6
New York, N. Y	27	12	13	28	n. 45 w.	21
Harrisburg, Pa †	7	6	9	16	n. 82 w.	7
Philadelphia, Pa	24	14	16	24	n. 42 w.	12
Scranton, Pa	26	15	14	24	n. 42 w.	15
Atlantic City, N. J	5	17	15	30	s. 51 w.	19
Cape May, N. J	15	19	14	28	s. 74 w.	15
Baltimore, Md	10	13	18	32	s. 78 w.	14
Washington, D. C	24	19	16	18	n. 22 w.	5
Lynchburg, Va	15	21	4	35	s. 79 w.	32
Norfolk, Va	14	33	9	16	s. 20 w.	20
Richmond, Va	16	27	9	22	s. 50 w.	17
South Atlantic States.						
Charlotte, N. C	10	38	8	22	s. 27 w.	31
Hatteras, N. C	14	31	6	27	s. 51 w.	27
Raleigh, N. C	11	28	3	31	s. 59 w.	33
Wilmington, N. C	10	29	3	33	s. 58 w.	36
Charleston, S. C	13	21	6	29	s. 71 w.	24
Augusta, Ga	7	24	8	32	s. 55 w.	29
Savannah, Ga	9	26	5	33	s. 69 w.	33
Jacksonville, Fla	11	27	13	25	s. 37 w.	20
Florida Peninsula.						
Jupiter, Fla	14	23	16	24	s. 42 w.	12
Key West, Fla	24	16	31	7	n. 72 e.	25
Tampa, Fla	17	20	13	25	s. 76 w.	12
Eastern Gulf States.						
Atlanta, Ga	10	26	10	32	s. 54 w.	27
Macon, Ga †	6	13	2	15	s. 62 w.	15
Pensacola, Fla †	12	12	6	10	w.	4
Mobile, Ala	18	27	11	19	s. 42 w.	12
Montgomery, Ala	11	28	13	20	s. 22 w.	19
Meridian, Miss †	9	13	3	16	s. 73 w.	14
Vicksburg, Miss	16	29	11	15	s. 17 w.	14
New Orleans, La	20	25	15	20	s. 45 w.	7
Western Gulf States.						
Shreveport, La	13	28	12	18	s. 22 w.	16
Fort Smith, Ark	16	21	18	22	s. 39 w.	6
Little Rock, Ark	17	24	9	27	s. 69 w.	19
Corpus Christi, Tex	15	33	23	7	s. 42 e.	24
Fort Worth, Tex †	22	26	4	24	s. 79 w.	20
Galveston, Tex	15	32	21	11	s. 30 e.	20
Palestine, Tex	19	31	6	16	s. 40 w.	16
San Antonio, Tex	28	18	21	13	n. 39 e.	13
Ohio Valley and Tennessee.						
Chattanooga, Tenn	8	28	14	27	s. 33 w.	24
Knoxville, Tenn	14	25	10	31	s. 62 w.	24
Memphis, Tenn	13	27	12	25	s. 43 w.	19
Nashville, Tenn	16	30	5	25	s. 55 w.	24
Lexington, Ky †	4	16	4	12	s. 34 w.	14
Louisville, Ky	10	26	10	30	s. 61 w.	23
Evansville, Ind †	4	15	7	11	s. 20 w.	12
Indianapolis, Ind	12	26	10	26	s. 49 w.	21
Cincinnati, Ohio	14	23	12	53	s. 67 w.	23
Columbus, Ohio	9	24	14	30	s. 47 w.	22
Pittsburg, Pa	21	19	9	33	n. 83 w.	24
Parkersburg, W. Va	12	20	11	30	s. 67 w.	21
Elkins, W. Va	10	15	4	33	s. 80 w.	28
Lower Lake Region.						
Buffalo, N. Y	10	19	14	29	s. 59 w.	18
Oswego, N. Y	14	23	18	22	s. 24 w.	10
Rochester, N. Y	14	25	11	28	s. 57 w.	20
Erie, Pa	15	18	10	31	s. 82 w.	21
Cleveland, Ohio	14	27	16	21	s. 21 w.	14
Sandusky, Ohio	15	22	15	26	s. 58 w.	13
Toledo, Ohio	11	23	16	27	s 43 w.	16
Detroit, Mich	16	23	15	25	s. 55 w.	12
Upper Lake Region.						
Alpena, Mich	18	11	23	23	n.	7
Escanaba, Mich	33	12	9	14	n. 25 w.	23
Grand Haven, Mich	18	14	19	24	n. 51 w.	6
Houghton, Mich. †	11	3	15	8	n. 41 e.	11
Marquette, Mich	28	7	18	27	n. 23 w.	23
Port Huron, Mich	19	23	11	22	s. 70 w.	12
Sault Ste. Marie, Mich	17	12	24	24	n.	5
Chicago, Ill	18	20	19	21	s. 45 w.	3
Milwaukee, Wis.	17	13	15	22	n. 60 w.	8
Green Bay, Wis	31	14	10	15	n. 16 w.	18
Duluth, Minn	35	4	27	14	n. 31 e.	25
North Dakota.						
Moorhead, Minn	31	11	18	18	n.	20
Bismarck, N. Dak	28	10	23	14	n. 27 e.	20
Williston, N. Dak	27	20	13	14	n. 8 w.	7
Upper Mississippi Valley.						
St. Paul, Minn	30	8	18	20	n. 5 w.	22
***Upper Mississippi Valley.*—Cont'd.**						
La Crosse, Wis †	13	9	6	7	n. 14 w.	4
Davenport, Iowa	18	12	18	29	n. 61 w.	12
Des Moines, Iowa	25	17	17	17	n.	8
Dubuque, Iowa	19	16	16	24	n. 69 w.	8
Keokuk, Iowa	13	20	15	28	s. 62 w	15
Cairo, Ill	14	28	7	26	s. 54 w.	24
Springfield, Ill	16	20	10	27	s. 77 w.	18
Hannibal, Mo †	8	9	4	15	s. 85 w.	11
St. Louis, Mo	11	24	11	23	s. 43 w.	18
Missouri Valley.						
Columbia, Mo*	7	12	7	11	s. 39 w.	6
Kansas City, Mo	25	22	8	21	n. 77 w.	13
Springfield, Mo	16	21	8	29	s. 77 w.	22
Lincoln, Nebr	28	19	12	17	n. 29 w.	10
Omaha, Nebr	28	13	14	17	n. 11 w.	15
Valentine, Nebr	34	6	9	29	n. 36 w.	34
Sioux City, Iowa †	15	7	8	9	n. 7 w.	8
Pierre, S. Dak	30	10	21	12	n. 24 e.	22
Huron, S. Dak	30	9	17	23	n. 16 w.	22
Yankton, S. Dak †	17	5	4	11	n. 30 w.	15
Northern Slope.						
Havre, Mont	15	18	13	34	s. 82 w.	21
Miles City, Mont	19	24	13	19	s. 50 w.	8
Helena, Mont	7	25	7	37	s. 64 w.	41
Kalispell, Mont	3	28	15	29	s. 29 w.	29
Rapid City, S. Dak	28	7	12	27	n. 35 w.	26
Cheyenne, Wyo	33	9	3	34	n. 52 w.	39
Lander, Wyo	16	19	13	30	s. 83 w.	17
North Platte, Nebr	26	11	10	32	n. 56 w.	27
Middle Slope.						
Denver, Colo	22	21	13	21	n. 83 w.	8
Pueblo, Colo	29	10	15	21	n. 18 w.	20
Concordia, Kans	16	20	10	20	s. 68 w.	11
Dodge, Kans	26	13	12	29	n. 52 w.	22
Wichita, Kans	25	22	8	17	n. 72 w.	10
Oklahoma, Okla	30	22	9	15	n. 37 w.	10
Southern Slope.						
Abilene, Tex	19	25	10	23	s. 65 w.	14
Amarillo, Tex	22	22	11	24	w.	13
Southern Plateau.						
El Paso, Tex	19	5	12	39	n. 63 w.	30
Santa Fe, N. Mex	24	15	18	21	n. 18 w.	10
Flagstaff, Ariz	23	11	13	27	n. 49 w.	18
Phoenix, Ariz	18	7	9	17	n. 31 w.	14
Yuma, Ariz	27	12	11	22	n. 36 w.	19
Independence, Cal	38	9	4	25	n. 36 w.	36
Middle Plateau.						
Carson City, Nev	22	14	11	25	n. 60 w.	16
Winnemucca, Nev	21	16	15	22	n. 36 w.	9
Modena, Utah	23	9	19	23	n. 16 w.	15
Salt Lake City, Utah.	22	17	14	21	n. 54 w.	9
Grand Junction, Colo	23	15	20	21	n. 7 w.	8
Northern Plateau.						
Baker City, Oreg	19	28	9	25	s. 61 w.	18
Boise, Idaho	27	10	14	28	n. 39 w.	22
Lewiston, Idaho †	3	0	19	10	n. 72 e.	10
Pocatello, Idaho	4	19	8	32	s. 58 w.	28
Spokane, Wash	7	35	14	21	s. 14 w.	29
Walla Walla, Wash	4	41	3	21	s. 26 w.	41
North Pacific Coast Region.						
Astoria, Oreg	18	14	13	30	n. 77 w.	18
Neah Bay, Wash	2	15	22	31	s. 35 w.	16
Port Crescent, Wash *	0	2	9	21	s. 81 w.	12
Seattle, Wash	12	30	23	9	s. 39 e.	22
Tacoma, Wash	12	33	5	26	s. 45 w.	30
Portland, Oreg	13	29	8	24	s. 45 w.	23
Roseburg, Oreg	17	20	16	28	s. 76 w.	12
Middle Pacific Coast Region.						
Eureka, Cal	24	18	15	20	n. 40 w.	9
Mount Tamalpais, Cal	35	4	11	30	n. 31 w.	36
Red Bluff, Cal	41	10	8	11	n. 6 w.	31
Sacramento, Cal	24	21	17	19	n. 34 w.	4
San Francisco, Cal	15	7	2	40	n. 78 w.	39
South Pacific Coast Region.						
Fresno, Cal	30	5	6	37	n. 51 w.	40
Los Angeles, Cal	21	7	14	29	n. 47 w.	20
San Diego, Cal	23	8	25	27	n. 8 w.	15
San Luis Obispo, Cal	31	7	4	19	n. 32 w.	28
West Indies.						
Basseterre, St. Kitts Island	15	2	53	2	n. 76 e.	52
Bridgetown, Barbados	20	4	53	0	n. 84 e.	53
Cienfuegos, Cuba	29	17	27	4	n. 62 e.	26
Grand Turk, Turks Island, W. I †	7	12	19	2	s 74 e.	18
Havana, Cuba	17	16	35	7	n. 88 e.	28
Kingston, Jamaica	47	3	15	4	n. 14 e.	45
Port of Spain, Trinidad	11	7	48	5	n. 85 e.	43
Puerto Principe, Cuba	29	7	37	6	n. 55 e.	38
Roseau, Dominica, W. I	20	8	44	4	n. 73 e.	42
San Juan, Porto Rico	7	21	45	1	s. 72 e.	46
Santiago de Cuba, Cuba	27	22	22	8	n. 70 e.	15
Santo Domingo, S. Domingo, W. I.	41	11	15	2	n. 23 e.	33
Willemstad, Curaçao	2	0	61	0	n. 88 e.	61

* From observations at 8 p. m. only.

† From observations at 8 a. m. only.

TABLE IV.—*Thunderstorms and auroras, March*, 1901.

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	52	T.	2	1		3	2				4	11			3		1				4				5		9	2			2	7		56	14	T.
		A.																																0	0	A.
Arizona	56	T.						1	6	10	2																				1		7	27	6	T.
		A.																																0	0	A.
Arkansas	57	T.	1			2				10	17	2		3						1	5		1	1	1	1	2		5		10	1		63	16	T.
		A.																																0	0	A.
California	167	T.						1			2	1	1														1		5	4	1	12	1	29	10	T.
		A.																																0	0	A.
Colorado	81	T.																							1	1		2	2	1				7	5	T.
		A.																																0	0	A.
Connecticut	21	T.											7		1													1	1					10	4	T.
		A.																																0	0	A.
Delaware	5	T.											2															2						4	2	T.
		A.																																0	0	A.
Dist. of Columbia	4	T.																																0	0	T.
		A.																																0	0	A.
Florida	47	T.		1								3	1			1						5	1		2	2	3	6					1	26	11	T.
		A.																																0	0	A.
Georgia	55	T.					1			1	6	20			8		1		1			1			3	3	17	12			2	13	1	90	15	T.
		A.																																0	0	A.
Idaho	34	T.																									1	2					1	4	3	T.
		A.																																0	0	A.
Illinois	92	T.							1	1	5	6	1	6	1			1		2	17	5	1		3	37	18						1	106	16	T.
		A.																																0	0	A.
Indiana	58	T.			2					1	5	11									2					11	17					1		50	8	T.
		A.																																0	0	A.
Indian Territory	11	T.								1	2									2	3										1			9	5	T.
		A.																																0	0	A.
Iowa	149	T.												17	2	1				4	13	1			2	22	2							64	9	T.
		A.																																0	0	A.
Kansas	77	T.																												1	1			2	2	T.
		A.																																0	0	A.
Kentucky	41	T.				6				1	7	7										1				1	8	2						38	8	T.
		A.																																0	0	A.
Louisiana	46	T.	8				1	1	1	1	4	1			1			1	1		9	3	1	8	10					1	5	2		59	18	T.
		A.																																0	0	A.
Maine	19	T.																										4						4	1	T.
		A.																																0	0	A.
Maryland	48	T.								1		4	5	1	6	1						1	3				2	22						46	10	T.
		A.		1																				1										2	2	A.
Massachusetts	48	T.											1										1					6	3					11	4	T.
		A.																																0	0	A.
Michigan	106	T.		1								2								2					2	13	15	1						36	7	T.
		A.									1																							1	1	A.
Minnesota	67	T.		7	1					1				3										1	13									26	6	T.
		A.																																0	0	A.
Mississippi	44	T.	1		1	8	1			8	10	4		1	1						11			4	9	3	5		2	1	9	3		82	18	T.
		A.																																0	0	A.
Missouri	95	T.								4	29	7		10	1					14	32	1		1	4	7	1				5	1		117	17	T.
		A.																																0	0	A.
Montana	40	T.		1									1																				1	3	3	T.
		A.																												1				1	1	A.
Nebraska	142	T.																		3	1													4	2	T.
		A.																																0	0	A.
Nevada	40	T.																									1							1	1	T.
		A.																																0	0	A.
New Hampshire	19	T.																																0	0	T.
		A.																																0	0	A.
New Jersey	51	T.											9														9	24	3					45	4	T.
		A.																																0	0	A.
New Mexico	31	T.								4										1					1								1	7	4	T.
		A.																											1			1		2	2	A.
New York	99	T.											5								1					2	1	12	2					23	6	T.
		A.																																0	0	A.
North Carolina	56	T.				3					2	24	3									2				2	32	23						91	7	T.
		A.										1											1											2	2	A.
North Dakota	48	T.	1	1																					1									3	3	T.
		A.																									1							1	1	A.
Ohio	128	T.		1		1					2		6	1	22											9	43	5	1					91	10	T.
		A.																																0	0	A.
Oklahoma	23	T.	1								1									4	4				1					3	4			18	7	T.
		A.																																0	0	A.
Oregon	74	T.									8	6	1					2					1	1		1	2							22	8	T.
		A.																																0	0	A.
Pennsylvania	91	T.										4	5		4												2	14	1					30	6	T.
		A.																																0	0	A.
Rhode Island	7	T.																										4	2					6	2	T.
		A.																																0	0	A.
South Carolina	46	T.										17			1	1						1	1		1		20	14				3		59	9	T.
		A.																																0	0	A.
South Dakota	56	T.	1	11	3								1													2								18	5	T.
		A.																													1	1		2	2	A.
Tennessee	56	T.				16	5			1	6	8													1	2	10	3			1	1		54	11	T.
		A.																																0	0	A.
Texas	95	T.							1	5	1	1								3	3			7	3					1	2	1		28	11	T.
		A.																																0	0	A.
Utah	47	T.											2															2			1			5	3	T.
		A.																					1	1										2	2	A.
Vermont	16	T.																																0	0	T.
		A.																																0	0	A.
Virginia	50	T.				4	2					15	6		1	1						2	2				16	12						61	10	T.
		A.																																0	0	A.
Washington	64	T.							1									1												2				4	3	T.
		A.																																0	0	A.
West Virginia	43	T.				11					2	15	1		5							1					5	2						42	8	T.
		A.																																0	0	A.
Wisconsin	60	T.												1						3					12		3							19	4	T.
		A.																																0	0	A.
Wyoming	31	T.																						1										1	1	T.
		A.																																0	0	A.
Sums	2,898	T.	15	24	7	54	12	3	10	50	115	169	58	43	57	5	2	5	2	39	105	24	12	24	75	119	245	177	27	14	45	45	14	1,596	....	T.
		A.	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2	2	0	0	1	0	1	1	1	2	0	13	...	A.

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during March, 1901, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration. From—	Total duration. To—	Total am't of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y.	20-21			1.67														*			
Alpena, Mich.	19-20			0.92														*			
Atlanta, Ga.	26	2.40 a.m.	4.05 a.m.	2.07	3.33 a.m.	4.00 a.m.	0.24	0.69	1.00	1.30	1.65	1.79	1.80								
Atlantic City, N. J.	26			0.60														0.46			
Baltimore, Md.	20-21			1.00														0.42			
Binghamton, N. Y.	10-11			0.76														*			
Bismarck, N. Dak.	2			0.34														0.32			
Boise, Idaho	22			0.25														0.12			
Boston, Mass.	21			1.21														0.47			
Buffalo, N. Y.	26			0.61														0.11			
Cairo, Ill.	9-10			1.23														0.46			
Charleston, S. C.	10			0.81														0.66			
Chicago, Ill.	10			0.80														*			
Cincinnati, Ohio	10			0.60														0.31			
Cleveland, Ohio	25			0.32														0.27			
Columbia, Mo.	9-10			1.44														0.40			
Columbus, Ohio	25			0.23														0.16			
Denver, Colo.	27			0.28														*			
Des Moines, Iowa	9-10			1.47														0.15			
Detroit, Mich.	10			0.48														0.10			
Dodge, Kans.	9-10			0.32														*			
Duluth, Minn.	19-20			0.58														*			
Eastport, Me.	21-22			0.94														0.23			
Elkins, W. Va.	25-26			0.61														0.29			
Erie, Pa.	26			0.38														*			
Escanaba, Mich.	10-11			0.80														*			
Evansville, Ind.	19			0.61														0.37			
Fort Worth, Tex.	9			0.46														0.46			
Fresno, Cal.	11			0.34														*			
Galveston, Tex.	22-23			0.94														0.47			
Grand Junction, Colo.	18			0.35														*			
Harrisburg, Pa.	10-11			1.43														0.42			
Hatteras, N. C.	21			1.23														0.55			
Huron, S. Dak.	24-25			0.60														0.11			
Indianapolis, Ind.	9-10			1.08														0.23			
Jacksonville, Fla.	24	8.09 p.m.	10.30 p.m.	1.20	8.25 p.m.	8.50 p.m.	0.01	0.29	0.58	0.69	0.73	0.80	0.84	0.85	0.87	0.90	0.91	1.11			
Jupiter, Fla.	2			0.75														0.65			
Kalispell, Mont.	29-30			0.22														*			
Kansas City, Mo.	18-19			1.83														0.45			
Key West, Fla.	26-27	11.40 p.m.	2.55 a.m.	1.27	12.35 a.m.	1.45 a.m.	0.09	0.11	0.15	0.19	0.29	0.40	0.46	0.54	0.63	0.72	0.75	0 92	1.12		
Knoxville, Tenn.	25			0.58														0.38			
Lexington, Ky.	10-11			1.17														0.30			
Lincoln, Nebr.	29			0.68														*			
Little Rock, Ark.	8	2.25 p.m.	9.30 p.m.	1.44	7.05 p.m.	8.00 p.m.	0.57	0.05	0.13	0.18	0.22	0.28	0.33	0.39	0.41	0.70	0.78	0.81			
	9	1.30 p.m.	8.45 p.m.	1.34	6.10 p.m.	6.30 p.m.	0.42	0.09	0.28	0.48	0.58	0.60									
Los Angeles, Cal.	11			0.44														0.20			
Louisville, Ky.	25	4.30 a.m.	9.50 a.m.	0.80	5.17 a.m.	5.45 a.m.	0.02	0.09	0.17	0.32	0.48	0.57	0.60								
Macon, Ga.	25	7.35 p.m.	11.25 p.m.	2.38	8.10 p.m.	8.25 p.m.	0.10	0.28	0.78	0.84											
					9.10 p.m.	9.20 p.m.	1.03	0.44	0.94	0.98											
Memphis, Tenn.	9-10	8.52 p.m.	12.35 a.m.	1.56	9.09 p.m.	9.30 p.m.	0.02	0.78	0.92	0.97	1.02	1.05									
Meridian, Miss.	29-30			1.88														0.67			
Milwaukee, Wis.	19-20			1.07														*			
Montgomery, Ala.	30	2.04 p.m.	8.20 p.m.	1.36	3.50 p.m.	4.50 p.m.	0.13	0.07	0.17	0.22	0.24	0.28	0.32	0.47	0.70	0.78	0.79	1.01			
Nantucket, Mass.	21-22			1.20														0.48			
Nashville, Tenn.	10	2.30 a.m.	7.15 a.m.	0.98	2.31 a.m.	2.46 a.m.	T	0.29	0.42	0.51	0 54	0.56	0.58								
New Haven, Conn.	10-11			2.46														0.54			
New Orleans, La.	23	5.00 a.m.	9.40 a.m.	1.68	6.30 a.m.	7.10 a.m.	0.31	0.20	0.29	0.43	0.57	0.65	0.70	0.73	0.78						
New York, N. Y.	10-11	6.55 p.m.	8.48 a.m.	2.90	5.17 a.m.	7.10 a.m.	1.50	0.12	0.20	0.26	0.31	0.34	0.37	0.41	0.44	0.47	0.49	0.57	0.87	1.10	1.20
Norfolk, Va.	20-21			1.40														0.55			
Northfield, Vt.	20-21			1.07														0.18			
Oklahoma, Okla.	19			0.15														0.14			
Omaha, Nebr.	29-30			0.43														0.15			
Parkersburg, W. Va.	26			0.65														0.33			
Philadelphia, Pa.	10-11			1.34														0.38			
Pittsburg, Pa.	26			0.98														*			
Pocatello, Idaho	8			0.73														*			
Portland, Me.	11	D. N.	9.10 p.m.	2.84	11.15 a.m.	1.10 p.m.	0.65	0.04	0.08	0.12	0.16	0.21	0.26	0.31	0.36	0.41	0.47	0.60	0.83	1.12	1.39
Portland, Oreg.	26			0.29														0.17			
Pueblo, Colo.	28-29			0.54														*			
Raleigh, N. C.	25-26	5.35 p.m.	7.35 a.m.	1.48	5.43 p.m.	6.00 p.m.	T.	0.20	0.47	0.55	0.57	0.59									
Richmond, Va.	10-11			0.80														0.64			
Rochester, N. Y.	10			0.61														0.28			
St. Louis, Mo.	10			1.50														0.28			
St. Paul, Minn.	19-20			0.96														0.18			
Salt Lake City, Utah	11-12			0.80														*			
San Diego, Cal.	21			0.53														*			
Sandusky, Ohio	8-9			0.47														*			
San Francisco, Cal.	9-10			0.40														0.18			
Savannah, Ga.	30-31			1.11																	
Seattle, Wash.	24-25			0.32														0.13			
Spokane, Wash.	22			0.24														*			
Tampa, Fla.	1			1.15														0.55			
Toledo, Ohio	25			0.10					0 10												
Topeka, Kans.	18-19			0.75														*			
Vicksburg, Miss.	9	8.25 p.m.	D. N.	0.58	10.55 p.m.	11.18 p.m.	0.05	0.09	0.16	0.39	0.49	0.51									
Washington, D. C.	10-11	11.10 p.m.	2.40 a.m.	0.92	1.34 a.m.	2.35 a.m.	0.25	0.07	0.17	0.34	0.38	0.38	0.38	0.38	0.38	0 38	0.38	0.61			
Wilmington, N. C.	10-11	7.15 p.m.	D. N.	1.47	2.18 a.m.	2.31 a.m.	0.90	0.25	0.43	0.57											
Yankton, S. Dak.	29-30			0.20														*			
Basseterre, St. Kitts	5			0.15					0.15												
Bridgetown, Barbados	12			0.14														0.08			
Cienfuegos, Cuba	27	3.55 p.m.	6.35 p.m.	0.85	3.59 p.m.	4.14 p.m.	T.	0.19	0.49	0.75											
Havana, Cuba	20-21			0.45														*			
Kingston, Jamaica	22			0.24											0.24						
Port of Spain, Trin.	14-15			1.05														0.17			
Puerto Principe, Cuba	5			0.63														0.49			
Roseau, Dominica	5-6			0.74														0.12			
San Juan, Porto Rico	17-18	9.20 p.m.	2.05 a.m.	1.99	10.40 p.m.	11.55 p.m.	0.10	0.09	0.20	0.24	0.30	0.47	0.58	0.61	0.65	0.71	0.83	0.99	1.16		
Santiago de Cuba	2			1.03														0.69			
Santo Domingo, S. D.	22			0.25					0.25												
Willemstad, Curaçao	18			0.28														0.18			

*Self register not working.

TABLE VI.—*Data furnished by the Canadian Meteorological Service, March, 1901.*

Stations.	Pressure.			Temperature.				Precipitation.		
	Mean not reduced.	Mean reduced.	Departure from normal.	Mean.	Departure from normal.	Mean maximum.	Mean minimum.	Total.	Departure from normal.	Depth of snow.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F	29.66	29.80	—.10	29.2	+ 1.5	34.5	23.9	2.90	—1.97	5.6
Sydney, C. B. I	29.85	29.89	+.02	28.7	+ 2.5	36.5	21.0	6.68	+1.43	4 5
Halifax, N. S	29.79	29.90	+.01	31.6	+ 2.6	38.8	24.4	4.11	—1.75	10.6
Grand Manan, N. B	29.82	29 87	—.03	31.1	+ 1.3	37.6	24.5	5.24	+1.09	6.5
Yarmouth, N. S	29.82	29.90	+.02	32.2	+ 1.4	38.5	26.0	4.86	0.00	6.9
Charlottet'n, P. E. I	29.82	29.86	—.02	27.1	+ 1.7	35.4	18.8	1.60	—1.81	3.5
Chatham, N. B	29.84	29.86	—.04	23 9	+ 0.9	35.4	12.4	2.70	—1.54	8.2
Father Point, Que	29.84	29.87	—.04	21.0	+ 0.7	29.5	12.5	4.27	+1.81	22.1
Quebec, Que	29.54	29.89	—.06	21.8	+ 0.6	29.3	14.3	5.42	+1.51	27.3
Montreal, Que	......	......	......	......	......	......	......	......	......	....
Bissett, Ont	29.27	29.92	—.06	18.8	— 0.2	31.5	6.2	1.98	—0.31	16.7
Ottawa, Ont	29.52	29.86	—.12	24.3	+ 2.8	32.9	15.8	2 20	—0.48	13.0
Kingston, Ont	29.56	29.89	—.11	27 5	+ 1.9	35.3	19.7	3.67	+0.61	8.4
Toronto, Ont	29.49	29.89	—.14	30.0	+ 2.7	36 9	23.1	2.74	+0.14	13.6
White River, Ont	28.53	29.98	—.10	9.7	— 2.5	25.4	— 5.9	3.30	+2.15	32.6
Port Stanley, Ont	29.23	29.90	—.12	31.0	+ 3.8	38.8	23.3	3.06	+0.11	7.8
Saugeen, Ont	29.13	29.89	—.13	26.7	+ 2.0	34.9	18.6	4.68	+2.13	20.8
Parry Sound, Ont	29.15	29.88	—.14	24.2	+ 3.1	34.7	13.8	3.51	+0.89	22.8
Port Arthur, Ont	29.20	29.94	—.11	17.8	+ 1.0	28.8	6.8	0.66	—0.51	6.6
Winnipeg, Man	29.22	30.10	—.03	15.6	+ 3.3	28.9	2.3	0.26	—0.76	2.6
Minnedosa, Man	28.13	30.04	—.06	19.3	+ 6.8	30.9	7.7	0.51	—0.15	5.0
Qu'Appelle, Assin	27.63	30.00	—.08	19.8	+ 4.9	28.3	11.2	0.91	+0.27	8.8
Medicine Hat, Assin	......	......	......	......	......	......	......	......	......	....
Swift Current, Assin	27.32	29.99	—.10	28.2	+ 6.2	36.2	20.3	0.30	—0.52	3.0
Calgary, Alberta	26.28	29.90	—.15	30.4	+ 4.2	40.2	20.6	1.15	+0.89	11.5
Banff, Alberta	25.22	29.98	—.06	28.0	+ 7.8	38.2	17.8	1.35	+0.36	11.7
Edmonton, Alberta	27.53	29.89	—.11	32.9	+ 8.7	43.2	22.6	0.66	+0.01	6.6
Prince Albert, Sask	......	......	......	......	......	......	......	......	......	....
Battleford, Sask	28.18	30.01	—.04	18.8	+ 5.7	29.9	7.8	1.15	+0.79	11.5
Kamloops, B. C	28.72	30.02	—.01	42.6	+ 6.5	53.0	32.2	0.06	—0.51	...
Victoria, B. C	29.97	30.07	+.05	44.4	+ 2.5	49.5	39.3	0.93	—2.41	....
Barkerville, N. W. T.	25.51	29.91	......	29.3	+ 3.2	39.4	19.2	2.90	+0.97	26.0
Hamilton, Bermuda.	29.95	30.11	+.06	62.4	+ 0.2	68.0	56.8	8.55	+2.90	....

TABLE VII.—*Heights of rivers referred to zeros of gages, March, 1901.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn.[1]	1,954	14	......	......	......	......	......	......
Reeds Landing, Minn	1,884	12	4.3	31	− 0.8	1	1.0	5.1
La Crosse, Wis.	1,819	12	8.4	27, 28	3.2	1, 2	5.6	5.2
Prairie du Chien, Wis.[2]	1,759	18	......	......	......	......	......	......
Dubuque, Iowa[3]	1,699	15	9.4	31	7.0	22	8.2	2.4
Leclaire, Iowa[3]	1,609	10	6.5	21	3.5	18	5.4	3.0
Davenport, Iowa[4]	1,593	15	9.4	17	7.4	19	8.5	2.0
Muscatine, Iowa	1,562	16	11.1	22, 23	3.5	1-3	8.0	7.6
Galland, Iowa[5]	1,472	8	6.4	24-26	0.6	3	4.3	5.8
Keokuk, Iowa[5]	1,463	15	11.3	25	3.8	3	8.0	7.5
Hannibal, Mo	1,402	13	12.7	26	1.2	2	8.2	11.5
Grafton, Ill	1,306	23	15.7	28	3.9	3, 4	10.6	11.8
St. Louis, Mo	1,264	30	18.8	26	3.8	3	13.2	15.0
Chester, Ill	1,189	36	15.4	27	2.2	4	10.1	13.2
New Madrid, Mo	1,003	34	26.7	18, 19	7.5	7	18.4	19.2
Memphis, Tenn	843	33	23.8	22, 23	3.5	9	14.1	20.3
Helena, Ark	767	42	31.7	24	7.6	10	19.7	24.1
Arkansas City, Ark	635	42	33.4	25-30	8.9	11	20.8	24.5
Greenville, Miss	595	42	28.7	27-29	7.4	11	17.5	21.3
Vicksburg, Miss	474	45	32.0	30, 31	7.9	12	18.1	24.1
New Orleans, La	108	16	10.9	31	3.5	17	6.5	7.4
Missouri River.								
Bismarck, N. Dak.	1,309	14	7.6	28-30	3.0	1	5.2	4.6
Pierre, S. Dak.[6]	1,114	14	4.0	31	1.8	21	3.0	2.2
Sioux City, Iowa[7]	784	19	8.5	12	4.9	16, 17	5.7	3.6
Omaha, Nebr	669	18	7.8	8	4.6	12	6.1	3.2
Plattsmouth, Nebr	641	17	4.7	2	3.2	21, 22	3.9	1.5
St. Joseph, Mo	481	10	3.6	16	1.2	2, 8	2.6	2.4
Kansas City, Mo	388	21	10.7	22	6.9	4, 9	8.9	3.8
Boonville, Mo	199	20	10.2	23	3.0	5	7.0	7.2
Hermann, Mo	103	24	12.3	12	4.0	1	9.0	8.3
Osage River.								
Bagnell, Mo	70	28	15.2	12	2.2	9	6.4	13.0
Des Moines River.								
Des Moines, Iowa[8]	165	19	10.2	21	3.2	2-4, 7	5.7	7.0
Illinois River.								
Peoria, Ill	135	14	17.7	31	8.2	2	13.8	9.5
Beardstown, Ill	70	12	8.8	31	2.3	3	5.6	6.5
Youghiogheny River.								
Confluence, Pa	59	10	9.7	11	1.1	1	3.6	8.6
West Newton, Pa.[8]	15	23	11.0	11	2.2	9	4.5	8.8
Allegheny River.								
Warren, Pa	177	14	10.8	27	1.6	7, 8	4.9	9.2
Oil City, Pa	123	13	11.9	27	1.8	2, 3	5.6	10.1
Parker, Pa	73	20	13.5	27	1.6	1, 3	6.6	11.9
Monongahela River.								
Weston, W. Va.	161	18	4.2	5	0.0	1-4, 15-20, 26	0.7	4.2
Fairmont, W. Va	119	25	8.5	6	1.2	1	3.6	7.3
Greensboro, Pa.	81	18	14.0	10	7.5	1, 2	10.0	6.5
Lock No. 4, Pa	40	28	18.5	12	6.8	2	10.9	11.7
Conemaugh River.								
Johnstown, Pa.	64	7	8.7	11	1.3	1	3.9	7.4
Red Bank Creek.								
Brookville, Pa	35	8	3.8	12	1.6	1-3	2.8	2.2
Beaver River.								
Ellwood Junction, Pa.[9]	10	14	13.0	10	4.3	30, 31	5.9	8.7
Great Kanawha River.								
Charleston, W. Va	61	30	12.0	6	5.1	20	7.0	6.9
Little Kanawha River.								
Glenville, W. Va	100	24	5.5	5, 27	− 0.8	1	2.4	6.3
New River.								
Hinton, W. Va	95	14	5.6	28	1.9	2-4	2.9	3.7
Cheat River.								
Rowlesburg, W. Va.[8]	36	14	9.0	12	4.0	8, 9, 22-26	5.4	5.0
Ohio River.								
Pittsburg, Pa	966	22	19.4	12	0.8	1	10.2	18.6
Davis Island Dam, Pa	960	25	18.8	12	3.5	1	10.8	15.3
Wheeling, W. Va	875	36	29.7	12	6.3	1	15.7	23.4
Parkersburg, W. Va.[10]	785	36	29.0	14	4.4	4	16.0	24.6
Point Pleasant, W. Va	703	39	32.3	14	3.1	4	17.8	29.2
Huntington, W. Va	660	50	34.6	15	5.9	4	21.0	28.7
Catlettsburg, Ky	651	50	35.5	15	3.8	5	20.9	31.7
Portsmouth, Ohio	612	50	35.8	15	5.5	5	21.4	30.3
Cincinnati, Ohio	499	50	36.4	16	7.6	7	22.2	28.8
Madison, Ind	413	46	30.0	17	7.8	5	.....	22.2
Louisville, Ky	367	28	12.4	17	4.6	5, 6	8.7	7.8
Evansville, Ind	184	35	27.7	17	5.7	8, 9	16.5	22.0
Paducah, Ky	47	40	25.7	16, 17, 19, 20	5.8	8	16.8	20.9
Cairo, Ill	1,073	45	32.3	17-20	8.8	6	22.5	23.5
Muskingum River.								
Zanesville, Ohio	70	20	17.5	12	7.0	1, 2	10.8	10.5
Scioto River.								
Columbus, Ohio[9]	110	17	9.5	11	3.2	25	4.8	6.3
Miami River.								
Dayton, Ohio	69	18	7.0	11	1.3	1, 2	2.8	5.7
Wabash River.								
Mount Carmel, Ill	50	15	17.5	19	3.0	1-3	11.1	14.5
Licking River.								
Falmouth, Ky	30	25	5.5	11	1.0	22	2.6	4.5
Clinch River.								
Speers Ferry, Va	156	20	8.0	27	0.1	1, 4	1.0	7.9
Clinton, Tenn	46	25	15.0	29	3.9	8	6.6	11.1
Tennessee River.								
Knoxville, Tenn	614	29	16.0	27	1.4	5	3.7	14.6
Kingston, Tenn	534	25	13.8	28	2.0	1-5, 9	4.5	11.8
Chattanooga, Tenn	430	33	22.3	28	3.7	1-4	7.8	18.6
Tennessee River—Cont'd.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Bridgeport, Ala.	390	24	17.0	29	1.9	4	5.8	15.1
Florence, Ala	220	16	13.4	31	2.4	1, 2	6.2	11.0
Riverton, Ala	190	25	19.0	31	2.8	2, 3	8.3	16.2
Johnsonville, Tenn	94	21	19.0	14	4.0	5, 6	9.0	15.0
Cumberland River.								
Burnside, Ky	434	50	14.7	12	2.4	4	6.4	12.3
Carthage, Tenn	257	40	12.8	14	2.7	4	6.3	10.1
Nashville, Tenn	175	40	16.1	15	4.1	5-8	8.5	12.0
Clarksville, Tenn	138	42	18.2	16	5.7	8	10.7	12.5
Arkansas River.								
Wichita, Kans	726	10	2.3	9	1.8	1, 2	2.0	0.5
Webbers Falls, Ind. T.	413	23	8.8	14	2.1	8, 9	3.6	6.7
Fort Smith, Ark	351	22	11.3	14	2.5	8	5.4	8.8
Dardanelle, Ark	256	21	14.0	10	2.3	8	6.3	11.7
Little Rock, Ark	176	23	15.5	12	3.6	8	8.8	11.9
White River.								
Newport, Ark	150	26	23.5	15	2.6	8	11.8	20.9
Yazoo River.								
Yazoo City, Miss	80	25	16.6	31	11.8	9	14.4	4.8
Red River.								
Arthur City, Tex.	688	27	9.5	11	4.2	9	5.3	5.3
Fulton, Ark	565	28	20.0	15	4.5	8, 9	11.8	15.5
Shreveport, La	449	29	13.5	18, 19	2.5	9	8.3	11.0
Alexandria, La	139	33	14.1	25	4.0	11	8.8	10.1
Ouachita River.								
Camden, Ark	340	39	28.9	15	6.7	8	16.2	22.2
Monroe, La	100	40	22.8	29-31	11.5	9	17.5	11.3
Atchafalaya River.								
Melville, La	100	31	28.7	31	14.6	15	20.8	14.1
Susquehanna River.								
Wilkesbarre, Pa.	178	14	17.2	28	2.4	9	6.6	14.8
Harrisburg, Pa.	70	17	13.1	29	1.7	2	6.5	11.4
W. Br. of Susquehanna.								
Williamsport, Pa.	35	20	15.0	12	0.9	1	5.9	14.1
Juniata River.								
Huntingdon, Pa.[11]	80	24	9.8	11	4.0	9	5.3	5.8
Potomac River.								
Harpers Ferry, W. Va	170	16	12.2	12	1.8	1-9	3.3	10.4
James River.								
Lynchburg, Va	257	18	6.3	12	0.3	3, 4	2.2	6.0
Richmond, Va.	110	12	5.0	13	− 0.8	3-5, 12	0.5	5.8
Roanoke River.								
Weldon, N. C.	90	40	31.0	28	8.3	5-11	11.4	22.7
Cape Fear River.								
Fayetteville, N. C	100	38	36.0	28	3.0	10	7.8	33.0
Edisto River.								
Edisto, S. C	75	6	5.0	31	4.0	26, 27	4.4	1.0
Pedee River.								
Cheraw, S. C	145	27	31.4	28	1.4	10	5.9	30.0
Black River.								
Kingstree, S. C	60	12	8.0	1, 2	5.6	25	6.8	2.4
Lynch Creek.								
Effingham, S. C	35	12	9.0	31	3.9	23-25	5.3	5.1
Santee River.								
St. Stephens, S. C	50	12	7.5	31	3.7	11	5.5	3.8
Congaree River.								
Columbia, S. C	37	15	18.1	28	− 0.2	10, 11	2.5	18.3
Wateree River.								
Camden, S. C	45	24	29.6	28	3.1	9, 10	7.5	26.5
Waccamaw River.								
Conway, S. C	40	7	5.6	28-31	4.0	19, 20	4.8	1.6
Savannah River.								
Calhoun Falls, S. C	347	......	16.5	27	2.6	7-9	4.2	13.9
Augusta, Ga	268	32	29.8	27	7.7	9	11.0	22.1
Broad River.								
Carlton, Ga	30	......	14.1	27	2.5	8-10	3.8	11.6
Flint River.								
Albany, Ga	80	20	17.0	31	4.1	8	7.7	12.9
Chattahoochee River.								
Westpoint, Ga	239	20	13.0	29	3.4	10, 19, 20	4.8	9.6
Ocmulgee River.								
Macon, Ga	125	20	16.1	26, 27	3.3	20	5.8	12.8
Oconee River.								
Dublin, Ga	60	30	16.5	31	2.8	9, 10	5.7	13.7
Coosa River.								
Rome, Ga	225	30	27.0	27	2.8	9	7.3	24.2
Gadsden, Ala	144	18	22.0	31	2.8	7-9	7.7	19.2
Alabama River.								
Montgomery, Ala	265	35	33.5	31	5.5	9	11.6	28.0
Selma, Ala	212	35	34.5	31	7.7	9	14.3	26.8
Tombigbee River.								
Columbus, Miss	303	33	19.4	14	0.9	1	6.2	18.5
Demopolis, Ala.	155	35	30.9	17	9.8	2	....	21.1
Black Warrior River.								
Tuscaloosa, Ala	129	43	37.2	27	7.3	2	17.2	29.9
Brazos River.								
Kopperl, Tex.	369	21	− 0.2	1-31	− 0.2	1-31	−0.2	0.0
Waco, Tex	301	22	2.4	30, 31	1.0	1-29	1.1	1.4
Columbia River.								
Umatilla, Oreg	270	25	10.9	4	5.5	31	7.1	5.4
The Dalles, Oreg	166	40	17.1	4	8.8	31	11.4	8.3
Willamette River.								
Albany, Oreg	99	20	14.0	1	5.1	21	7.9	8.9
Portland, Oreg	10	15	14.4	2	6.7	17	9.0	7.7
Sacramento River.								
Red Bluff, Cal	241	23	12.4	1	4.2	31	7.4	8.2
Sacramento, Cal	70	29	27.3	2	21.3	31	23.5	6.0

[1] Frozen for 24 days. [2] Frozen for 25 days. [3] Frozen for 17 days. [4] Frozen for 16 days. [5] Frozen for 2 days. [6] Frozen for 13 days. [7] Frozen for 11 days. [8] Frozen for 3 days. [9] Frozen for 8 days. [10] 30 days only. [11] Frozen for 5 days.

XXIX—31.

Chart I. Tracks of Centers of High Areas. March, 1921.

Chart I. Tracks of Centers of High Areas. March, 1901.

Chart II. Tracks of Centers of Low Areas. March, 1901.

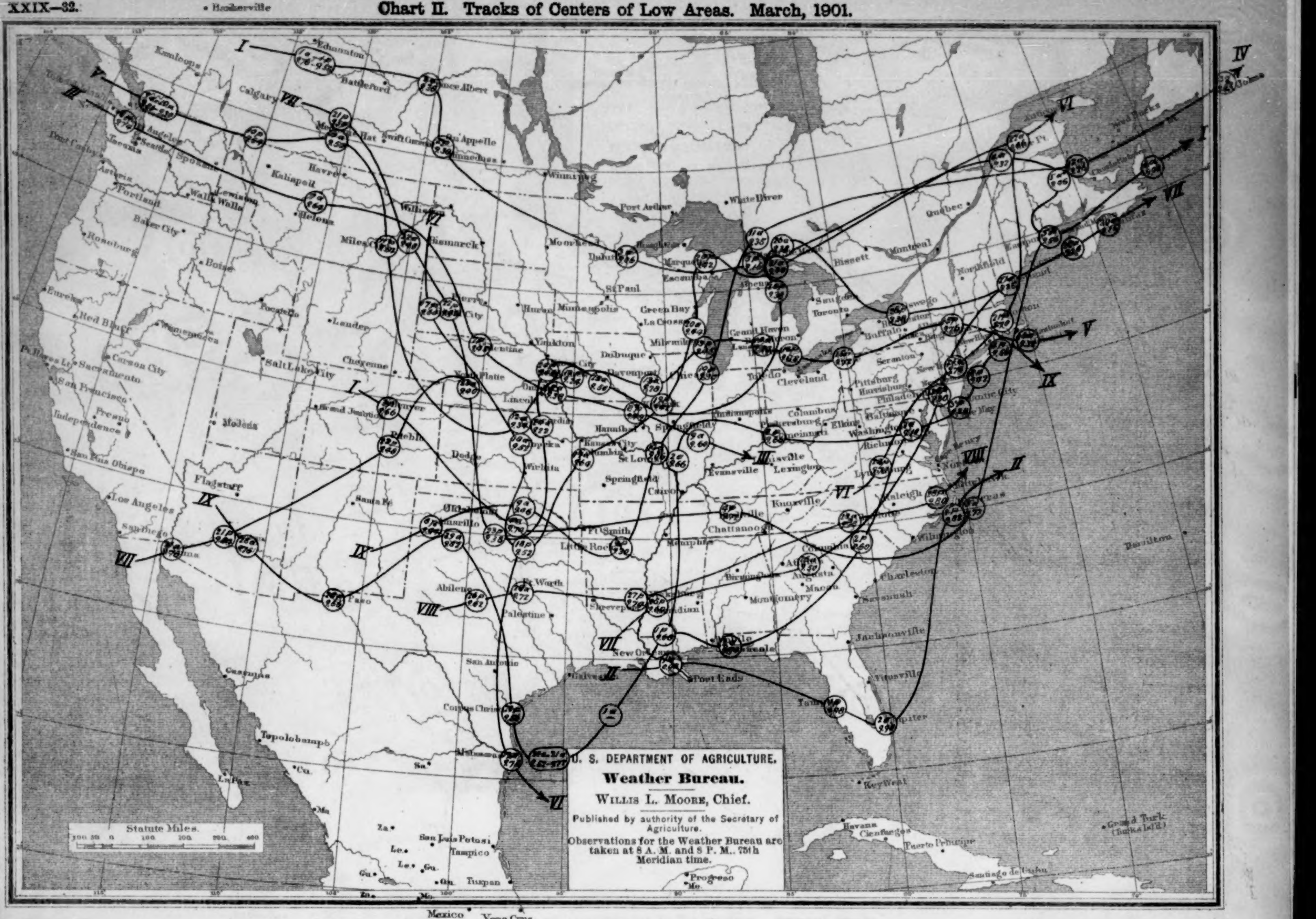


Chart III. Total Precipitation. March, 1901.

• Barkerville

Chart III. Total Precipitation. March, 1901.

Chart IV. Sea-Level Pressure and Temperature; Resultant Surface Winds. March, 1901.

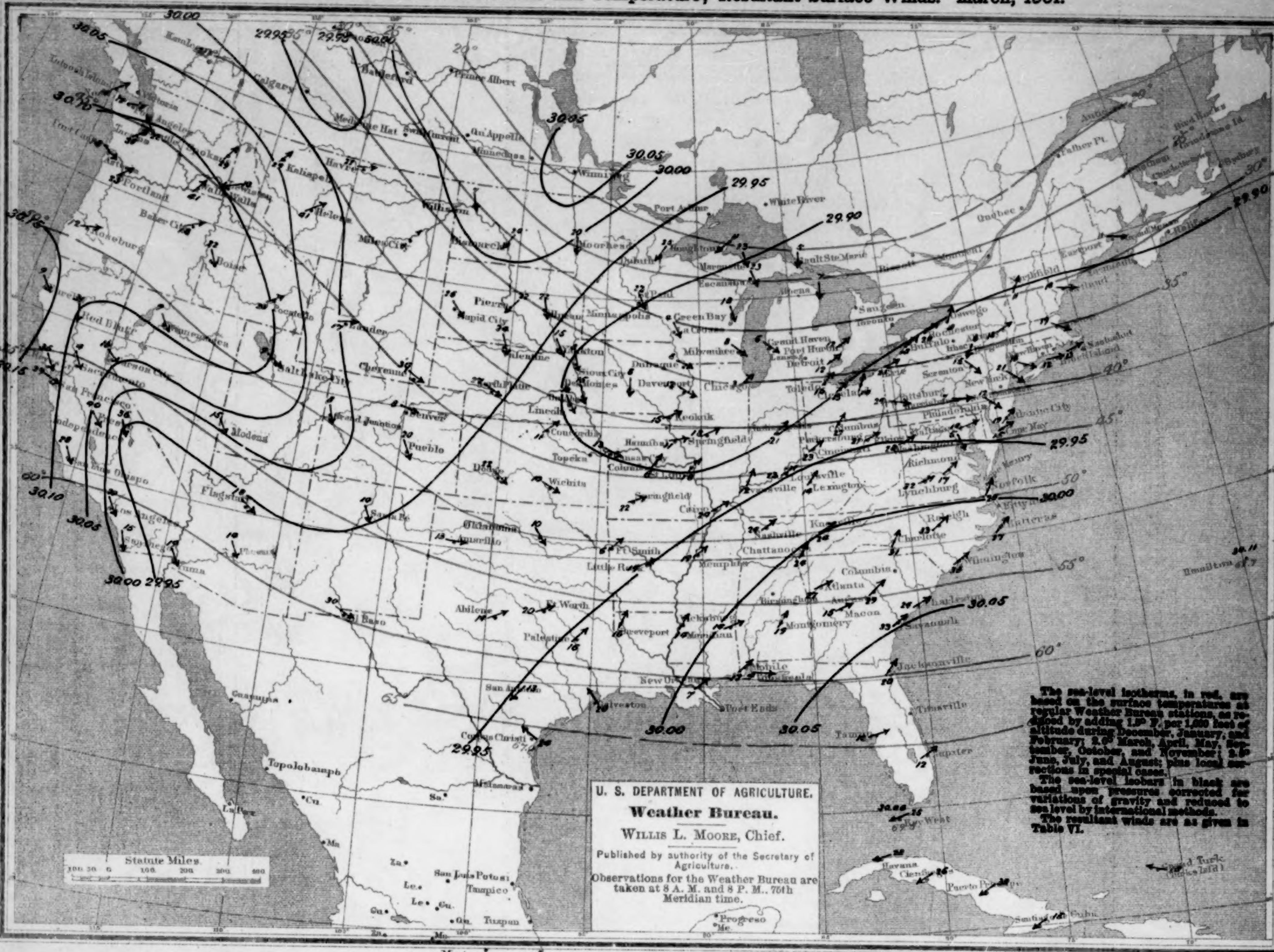


Chart V. Hydrographs for Seven Principal Rivers of the United States. March, 1901.

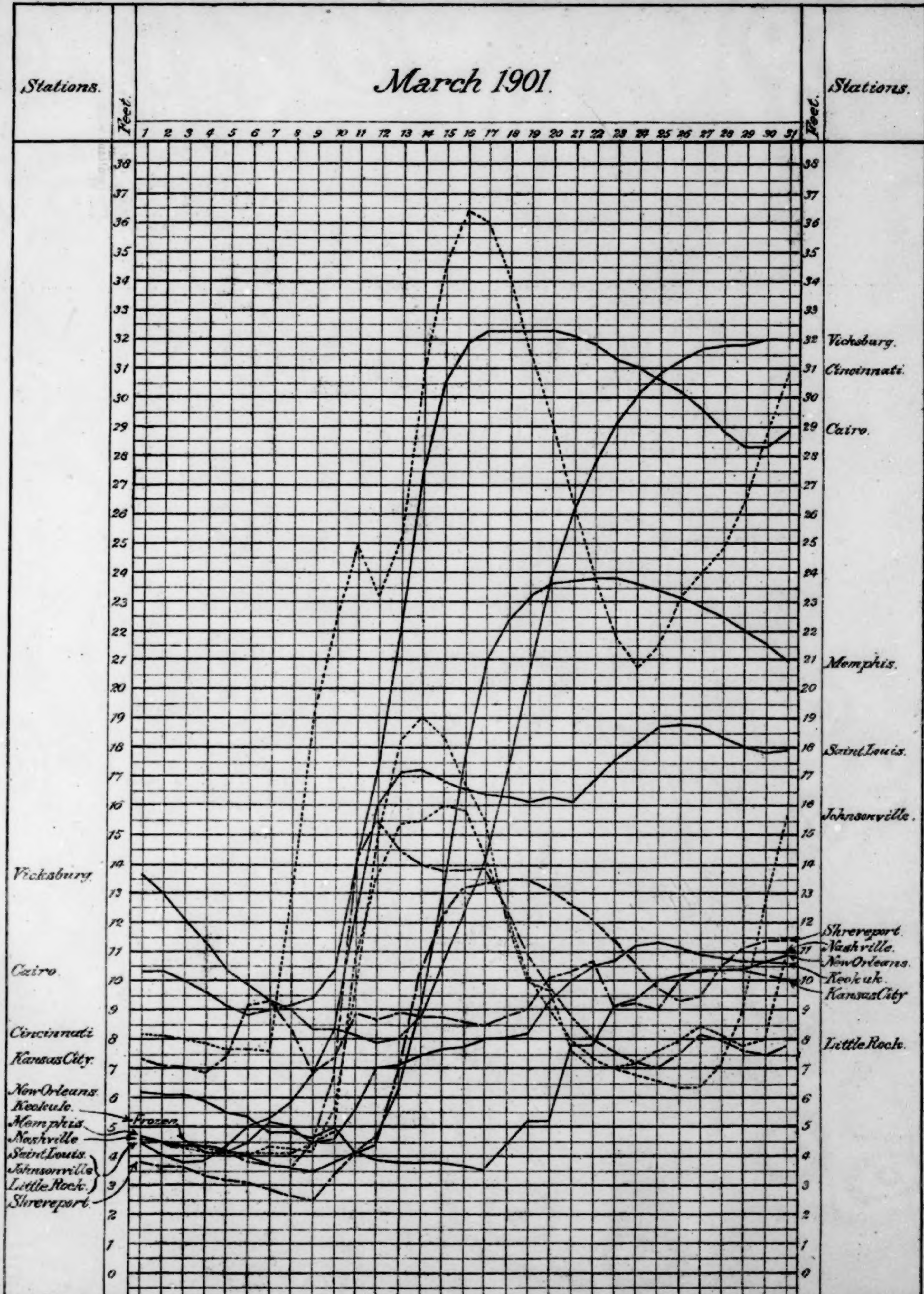


Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. March, 1901.

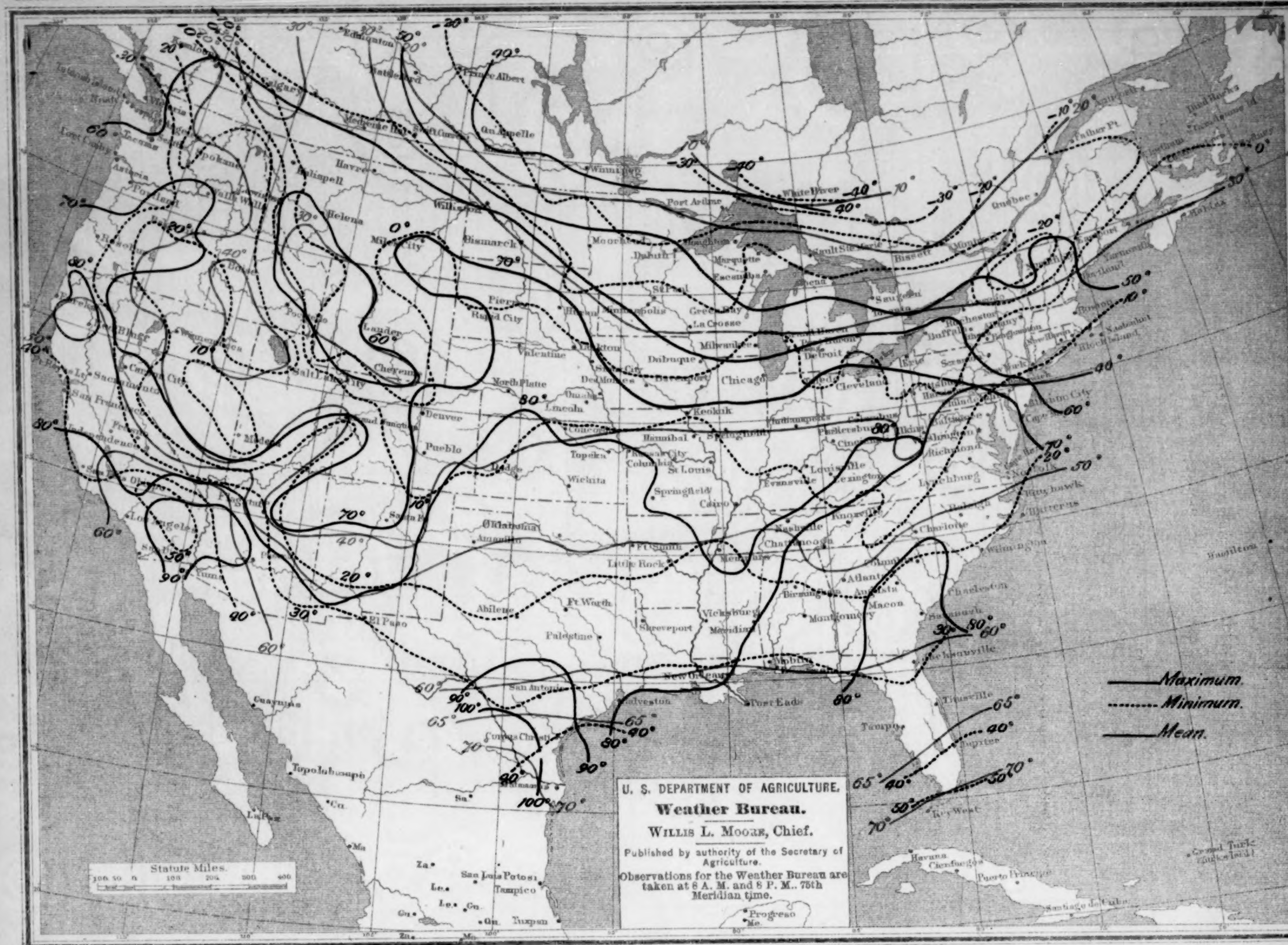


Chart VII. Percentage of Sunshine. March, 1901.

Chart VII, Percentage of Sunshine. March, 1901.

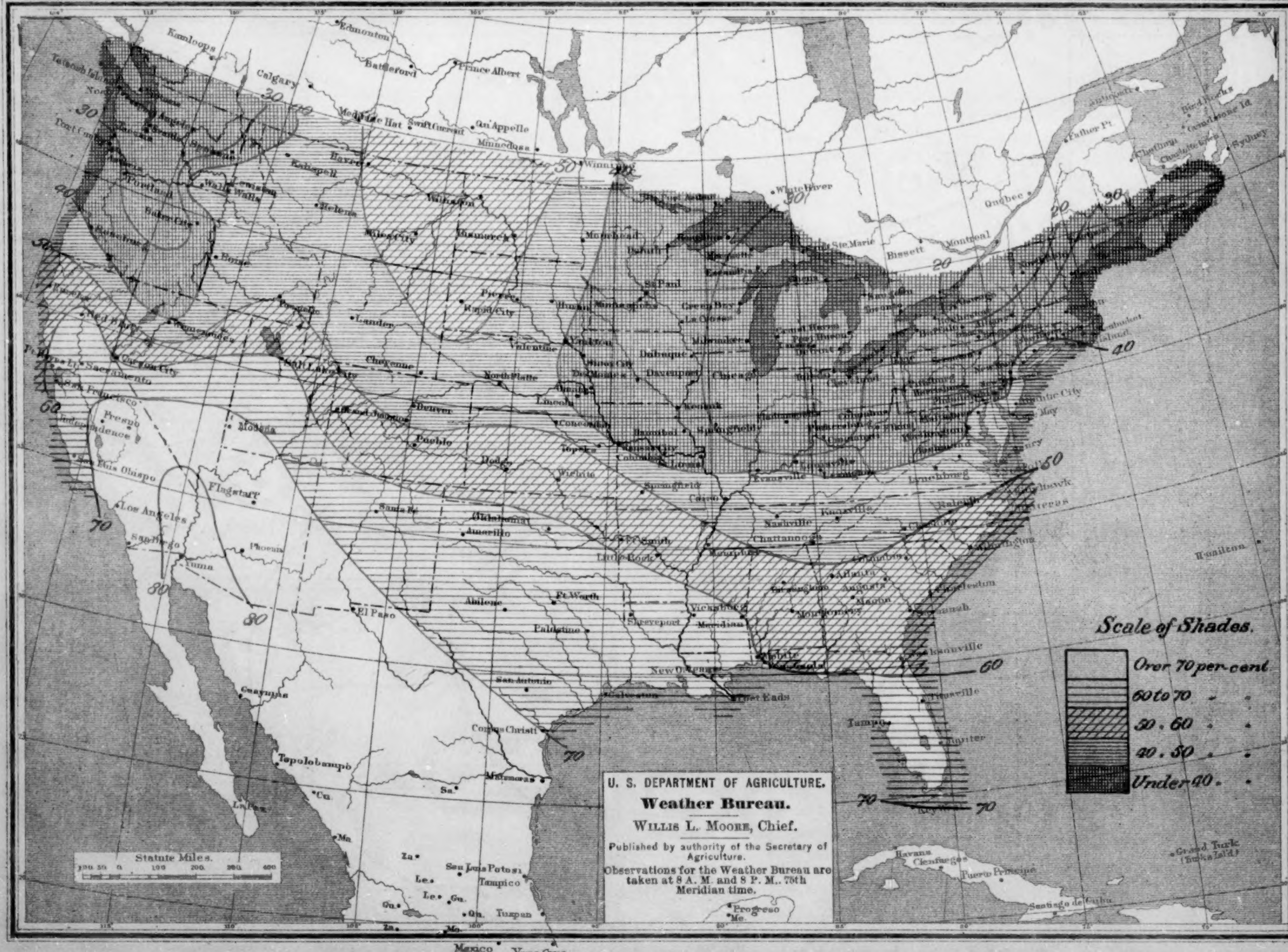
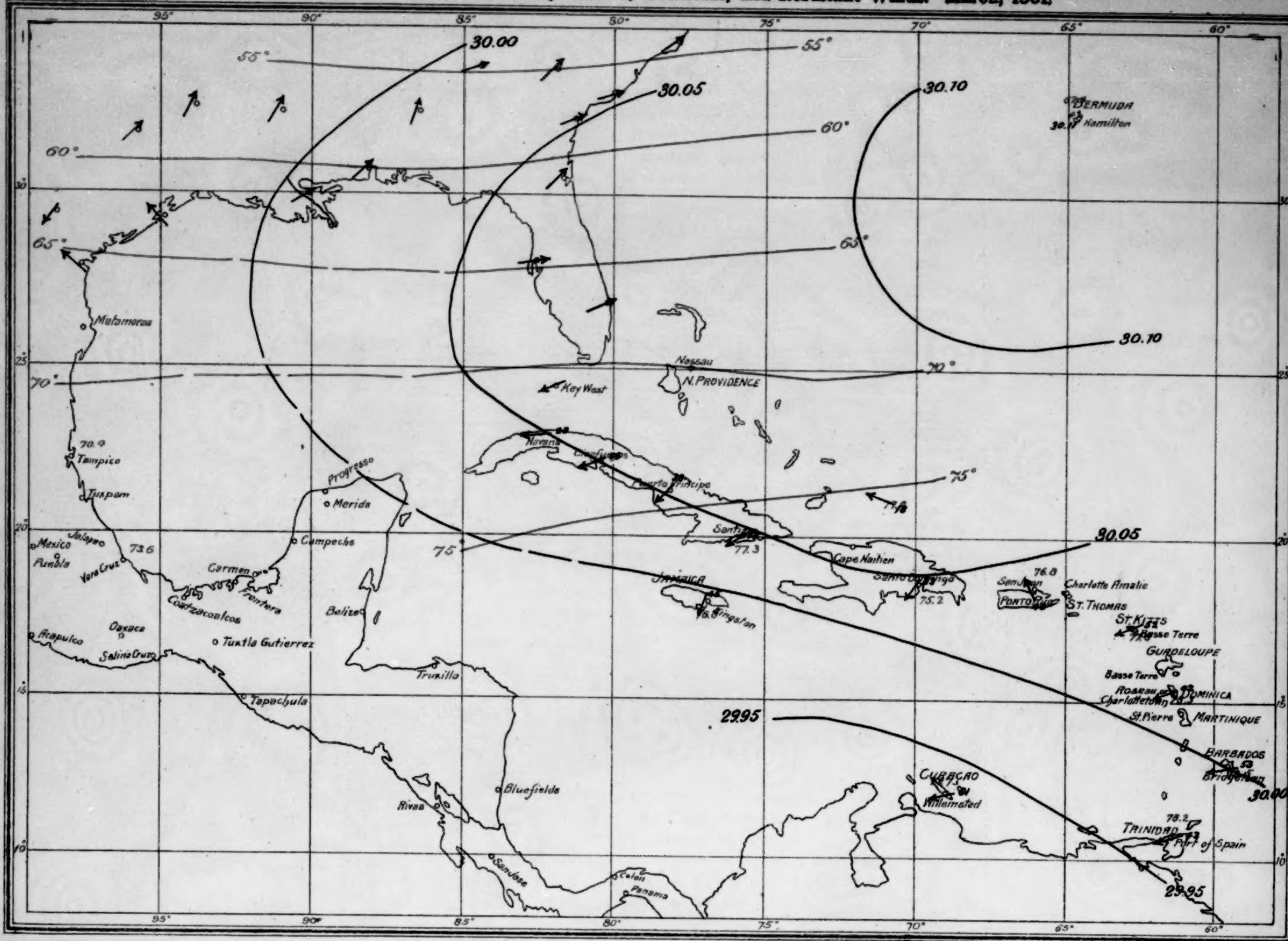


Chart VIII. West Indian Monthly Isobars, Isotherms, and Resultant Winds. March, 1901.



XXIX—39. • Barkerville

Chart IX. Total Snowfall for March, 1901.

Chart IX. Total Snowfall for March, 1901.

FIG. 1.

FIG. 2.